1/8/87

# TECHNICAL DATA BASE
# FOR WILLITS GENERAL PLAN




CITY OF WILLITS
WILLITS, CALIFORNIA

# CONTENTS

# I. INTRODUCTION

The purpose of this report is to present a compilation of available background information of value to the General Plan Revision Program of the City of Willits. The revised General Plan in its adopted form will be expressed in the form of a concise, but comprehensive, policy document in which the City's short- and long-range goals and objectives for future physical development, change and growth will be stated. These policies will cover a broad range of subjects affecting physical and social aspects of Willits' environment.

Resolution of many of the issues to be addressed by the revised General Plan may require consideration of technical material and factual data which can provide a framework for evaluating alternative policy choices. Once policy determinations have been made and expressed in the adopted General Plan, certain types of technical data will be needed to guide and inform the process of plan implementation. This report is designed to provide the data base for policy determinations and plan development, as well as for plan implementation.

The Data Base and Information Resources Report contains copies of relevant tables and figures, most of which have appeared in previously published documents. These data are organized according to ten major subject categories:

- Population characteristics and projections
- Land Use, Zoning and Planning
- Economic Development
- Circulation and Transportation
- Parks and Recreation
- Natural Resources and Infrastructure
- Other Urban Services
- Noise
- Environmental Hazards

A Table of Contents precedes each chapter for the data item appearing within each chapter, together with citations of the source documents used.

In general, the Technical Data Base report is designed to be a flexible, open-ended document using a loose leaf format which may be expanded and updated from time to time. It is intended that copies of this version of the report will be available for public use at City Hall and at the Public Library.

## II. POPULATION CHARACTERISTICS AND PROJECTIONS

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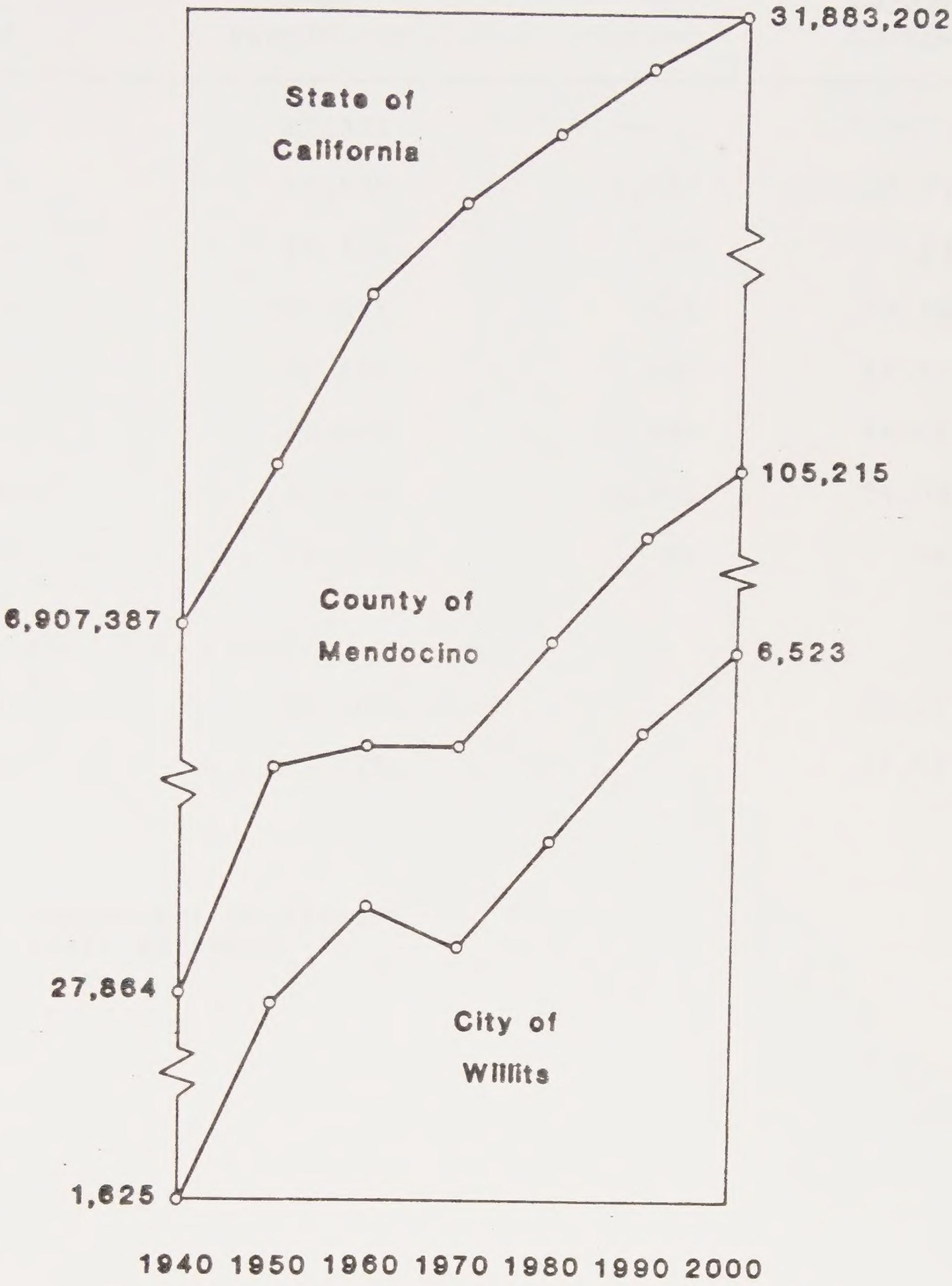
# Population Trends




(Logarithmic Vertical Scale)

TOTAL POPULATION, MENDOCINO COUNTY

BY DECADE: 1900 to 1980

| Year | Total Population | Net Change | Percent Change |
|---|---|---|---|
| 1900 | 20,500 | --- | --- |
| 1910 | 23,929 | 3,429 | 16.7% |
| 1920 | 24,116 | 187 | .8% |
| 1930 | 23,505 | -611 | -2.5% |
| 1940 | 27,864 | 4,359 | 18.5% |
| 1950 | 40,854 | 12,990 | 46.6% |
| 1960 | 51,059 | 10,205 | 25.0% |
| 1970 | 51,101 | 42 | .08% |
| Source: U.S. Census | | | |
| 1980 1/ | 65,500 | | 28.2% |
| 1980 2/ | 73,226 | | 43.3% |

1/ Department of Finance
2/ Staff estimate

## Population and Population Ratios

| | City of Willits | | County of Mendocino | | State of California | |
|---|---|---|---|---|---|---|
| | Number | % of Co. | Number | % of State | Number | % of U.S. |
| April 1940 | 1,625 | 5.83 | 27,864 | 0.40 | 6,907,387 | 3.98 |
| April 1950 | 2,691 | 6.59 | 40,854 | 0.39 | 10,586,223 | 7.00 |
| April 1960 | 3,410 | 6.68 | 51,059 | 0.32 | 15,717,204 | 8.76 |
| April 1970 | 3,091 | 6.05 | 51,101 | 0.26 | 19,971,069 | 9.83 |
| April 1980 | 4,008 | 6.01 | 66,738 | 0.28 | 23,668,562 | -- |
| July 1980 | 4,036 | 6.01 | 67,200 | 0.28 | 23,773,000 | 10.73 |
| July 1981 | 4,161 | 6.01 | 69,180 | 0.29 | 24,185,999 | 10.81 |
| July 1982 | 4,290 | 6.02 | 71,218 | 0.29 | 24,606,172 | 10.90 |
| July 1983 | 4,423 | 6.03 | 73,316 | 0.29 | 25,033,646 | 10.99 |
| July 1984 | 4,560 | 6.04 | 75,476 | 0.30 | 25,468,545 | 11.08 |
| July 1985 | 4,701 | 6.05 | 77,700 | 0.30 | 25,911,000 | 11.16 |
| July 1986 | 4,816 | 6.06 | 79,477 | 0.30 | 26,298,062 | 11.23 |
| July 1990 | 5,307 | 6.10 | 87,000 | 0.31 | 27,905,000 | 11.48 |
| July 1995 | 5,879 | 6.15 | 95,593 | 0.32 | 29,872,669 | 11.89 |
| July 2000 | 6,523 | 6.20 | 105,215 | 0.33 | 31,883,202 | 12.27 |

Sources: United States Census Bureau
California Department of Finance
Moore Research Corporation

## Average Annual Population Increase

| | City of Willits | | County of Mendocino | | State of California | |
|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % |
| April 1940 - April 1950 | 107 | 5.17 | 1,299 | 3.90 | 367,884 | 4.36 |
| April 1950 - April 1960 | 72 | 2.40 | 1,021 | 2.25 | 513,098 | 4.03 |
| April 1960 - April 1970 | -32 | -0.98 | 4 | 0.01 | 425,387 | 2.42 |
| April 1970 - April 1980 | 92 | 2.63 | 1,564 | 2.71 | 369,749 | 1.71 |
| April 1980 - July 1980 | 112 | 2.82 | 1,848 | 2.80 | 417,752 | 1.78 |
| July 1980 - July 1981 | 125 | 3.10 | 1,980 | 2.95 | 421,999 | 1.74 |
| July 1981 - July 1982 | 129 | 3.10 | 2,038 | 2.95 | 420,173 | 1.74 |
| July 1982 - July 1983 | 133 | 3.10 | 2,098 | 2.95 | 427,474 | 1.74 |
| July 1983 - July 1984 | 137 | 3.10 | 2,160 | 2.95 | 434,899 | 1.74 |
| July 1984 - July 1985 | 141 | 3.10 | 2,224 | 2.95 | 442,455 | 1.74 |
| Subtotal, 1980 - 1985 | 133 | 3.10 | 2,100 | 2.95 | 427,600 | 1.74 |
| July 1985 - July 1986 | 115 | 2.45 | 1,777 | 2.29 | 387,062 | 1.49 |
| July 1986 - July 1990 | 123 | 2.45 | 1,881 | 2.29 | 401,735 | 1.49 |
| Subtotal, 1985 - 1990 | 121 | 2.45 | 1,860 | 2.29 | 398,800 | 1.49 |
| July 1990 - July 1995 | 114 | 2.07 | 1,719 | 1.90 | 393,534 | 1.37 |
| July 1995 - July 2000 | 129 | 2.10 | 1,924 | 1.94 | 402,107 | 1.31 |

Sources: United States Census Bureau
California Department of Finance
Moore Research Corporation

## Age of the Willits' Population

| Year | Percent | | | Number | | |
|---|---|---|---|---|---|---|
| | Under 18 | 18 to 64 | 65 and over | Under 18 | 18 to 64 | 65 and over |
| 1960 | 38.9 | 52.9 | 8.2 | NA | NA | NA |
| 1970 | 34.4 | 54.8 | 10.7 | 1,064 | 1,695 | 332 |
| 1980 | 32.3 | 57.1 | 12.7 | 1,211 | 2,287 | 510 |

Source: United States Census Bureau

## Ethnic Distribution of Willits' Population

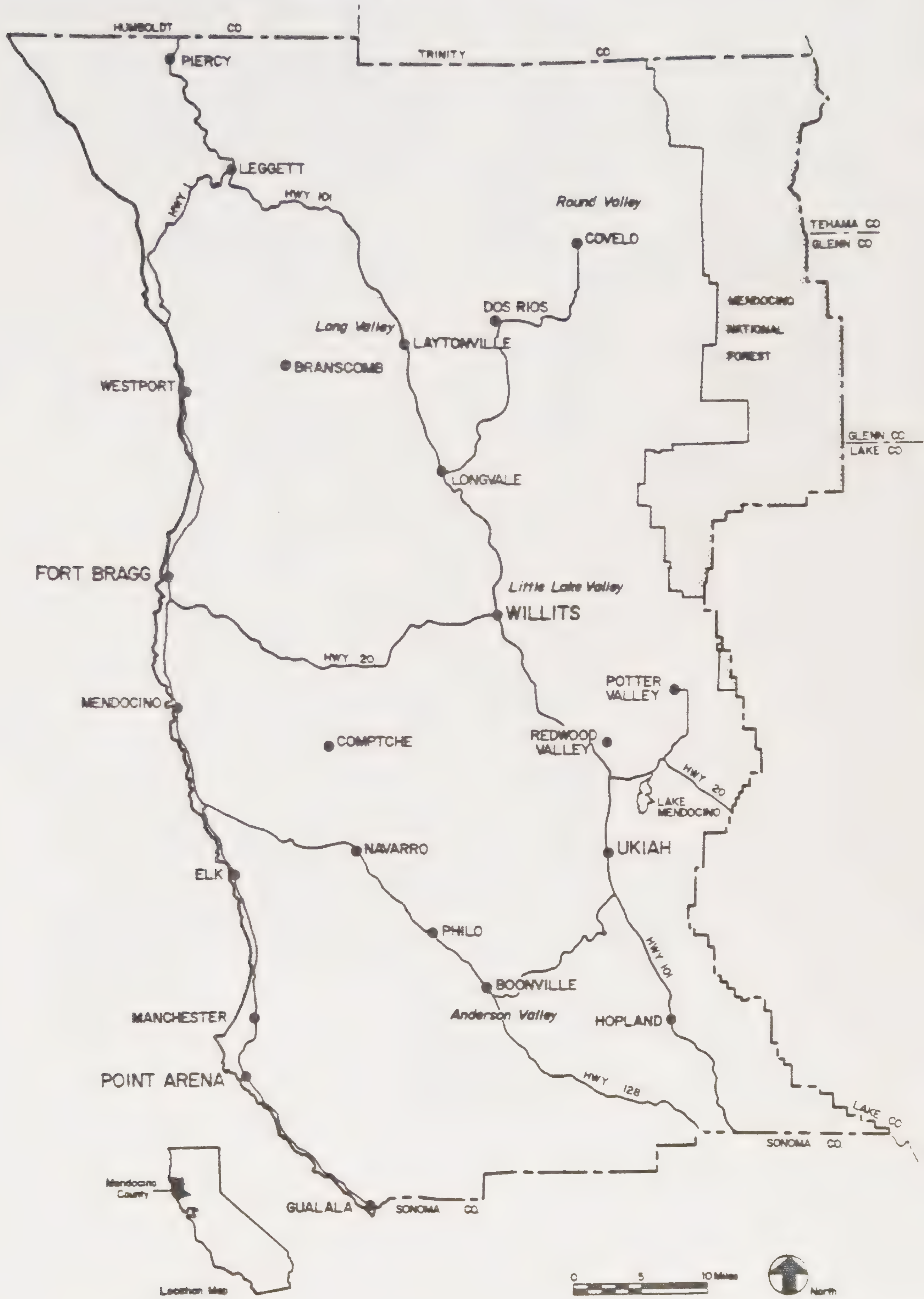
| Year | Percent | | | Number | | |
|---|---|---|---|---|---|---|
| | White | Black | Other | White | Black | Other |
| 1960 | 99.1 | 0.0 | 0.9 | 3,378 | 1 | 31 |
| 1970 | 96.2 | 0.0 | 3.8 | 2,972 | 0 | 119 |
| 1980 | 90.5 | 0.1 | 9.3 | 3,627 | 6 | 375 |

Source: United States Census Bureau

# III. LAND USE, ZONING AND PLANNING


REGIONAL LOCATION

# MENDOCINO COUNTY



CITY OF WILLITS

SUMMARY OF FINANCIAL TRANSACTION 1983-84

| | General Fund | Airport Enterprise | Sewer Enterprise | Solid Wst. Enterprise | Tr.Safety Fund | Gas Tax Fund | Rev.Sharing Fund | Bond Fund | WWCI/ WWCR | Special Funds | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Estimated Fund Balance 7/1/83 | ( 126,429) | (105,743) | 105,451 | -0- | -0- | 59,659 | 277,898 | 36,646 | (I) 8,578<br>(R) 51,246 | 1,340<br>(2) (43,675) | 264,971 |
| Estimated Revenue | 1,236,600 | 77,700 | 369,600 | 91,621 | 20,000 | 71,250 | 140,000 | 30,000 | (I) 5,000<br>(R) 2,000 | (1) 27,500<br>(2) 47,000<br>(4) 367,275 | 2,485,816 |
| Estimated Expenditures | (1,545,036) | (117,975) | (163,431) | ( 88,142) | | (60,000) | ( 800) | (34,756) | (I)(13,274 | (1) (28,840)<br>(2) ( 3,325)<br>(3) ( 5,000) | (2,453,354) |
| Transfers - Street Lighting | 55,000 | | | | | ( 55,000) | | | | (4)(367,275) | |
| Administrative | 45,000 | ( 15,000) | (15,000) | (15,000) | | | | | | (5) (25,500) | |
| Traffic Safety | 20,000 | | | | (20,000) | | | | | | |
| Dump Deficit | (11,521) | | | 11,521 | | | | | | | |
| Fringe | 113,700 | | | | | | (113,700) | | | | |
| WWCI/Hookups | | | (85,000) | | | | | | (I) 85,000 | | |
| Sewer Expansion | | | | | | | | | (R) (5,000 | (3) 5,000 | |
| WWCR | | | ( 6,000) | | | | | | (I) 6,000 | | |
| CDA Loan | | | | | | | ( 25,500) | | | (5) 25,500 | |
| Estimated Fund Balance 7/1/84 | (212,686) | (161,018) | 205,620 | -0- | -0- | 16,179 | 277,898 | 31,890 | (I) 91,304<br>(R) 48,246 | -0- | 297,433 |

***SPECIAL FUNDS

1. Solar Grant
2. Gymnasium Grant
3. Sewer Expansion
4. Sewer Upgrade Grant
5. Community Development Agency

100-GENERAL FUND REVENUE

REVENUE

| | COUNCIL APPROVAL 1982-83 | COUNCIL APPROVAL 1983-84 |
|---|---|---|
| **3001 - PROPERTY TAXES** | | |
| PROPERTY TAX/SECURED | 230000- | 260000- |
| CURRENT/UNSECURED | 15000- | 15000- |
| PRIOR - SECURED & UNSECURED | 15000- | 10000- |
| HOPTR | 11000- | 11000- |
| BITR | 26000- | 26000- |
| **3007 - OTHER TAXES** | | |
| SALES & USE TAXES | 500000- | 500000- |
| TRANSIENT OCCUPANCY TAXES | 40000- | 40000- |
| FRANCHISE TAXES - GAS | 12500- | 13000- |
| FRANCHISE TAXES - ELECTRIC | 32000- | 37000- |
| FRANCHISE TAXES - WATER | 3000- | 3000- |
| FRACHISE TAXES - CABLE TV | 3000- | 4000- |
| FRANCHISE TAX - GARBAGE | 5000- | 5000- |
| BUSINESS LICENSE FEES | 50000- | 100000- |
| PROPERTY TRANSFER TAX | 1000- | 1000- |
| **3008 - SERVICES** | | |
| POLICE SERVICES | 500- | 500- |
| LITTLE LAKE FIRE DIST SERVICE | 14200- | 15000- |
| STREET SERVICES | 5825- | 5500- |
| WEED ABATEMENT | 1500- | 1500- |
| POOL ADMISSIONS | 6000- | 6000- |
| POOL CONCESSIONS | 3000- | 3000- |
| POOL LESSONS | 7500- | 7500- |
| MISC - RECREATION | 500- | 500- |
| MISC SERVICES-PHOTO COPIES | 500- | 500- |
| **3009-INTERGOVERNMENTAL REVENUE** | | |
| STATE CIGARETTE TAX | 19000- | 20000- |
| MOTOR VEHICLE IN LIEU TAX | 78000- | 30000- |
| POST REIMBURSEMENTS | 10000- | 10000- |
| SB90 REIMBURSEMENTS | 3000- | 3000- |
| TRAILER COACH TAX | 6000- | 2000- |
| SB325 FUNDS | 4000- | 5000- |
| HEALTH & SAVETY FINES | 100- | 100- |
| MISC FINES & FORFEITS | 2000- | 2000- |

3010 - DEVELOPMENT FEES

| | | |
|---|---|---|
| BUILDING PERMIT FEES | 20000- | 40000- |
| PLANNING PERMITS | 5000- | 15000- |
| OTHER LICENCES & PERMITS | 3000- | 5000- |
| PLAN CHECK FEES | 700- | 5000- |
| EIR REIMBURSEMENTS | 2000- | 5000- |

3011 - INVESTMENT INCOME

| | | |
|---|---|---|
| INTEREST INCOME | 40000- | 10000- |
| COMMUNITY CTR-RENTS & | 5000- | 5000- |
| MISC - RENTS & LEASES | 1500- | 1500- |

3012 - MISCELLANEOUS REVENUE

| | | |
|---|---|---|
| MISC REV - GENERAL FUND | 5000- | 10000- |
| MISC REV - CULTURAL ARTS | | 3000- |
| TOTAL | 1187325- | 1236600- |

NET ACREAGE OF GENERAL PLAN MAP LAND USES

CITY OF WILLITS, CALIFORNIA

| General Plan Classification | Net Acreage | % of Total |
|---|---|---|
| Residential-Suburban | -0- | -0- |
| Residential-Low Density | 312.5 | 24.2 |
| Residential-Medium Density | 114.6 | 8.9 |
| Commercial-General | 98.1 | 7.6 |
| Industrial-General | 219.8 | 17.1 |
| Public Service | 168.6 | 13.1 |
| Open Space-Recreation | 23.2 | 1.8 |
| Vacant | 351.6 | 27.3 |
| | 1,288.4 | 100.0 |

## NET VACANT ACREAGE WITHIN PROPOSED WILLITS COMMUNITY DEVELOPMENT PROJECT

| General Plan Classification | Net Acreage | % |
|---|---|---|
| Residential-Low Density | 4.8 | .48% |
| Residential-Medium Density | 21.1 25.9 | 2.11% - 2.59 |
| Commercial-General | 46.1 | 2.59 4.61% |
| Industrial-General | 60.7 | 6.07% |
| Public Service | .6 | .006 |

PRINCIPAL FEATURES OF ZONING DISTRICTS
CITY OF WILLITS, CALIFORNIA

| ZONE | USE CONDITIONS | | | | | | | MAX. HT. FLOORS/ FT. | MINIMUM SITE REGS. | | MIN. YARDS (FT) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RETAIL | OFFICE | REST. | SVCS. | MFG.S. | MOTEL | GAS | | WIDTH | SQ. FT. | F | R | S |
| CO | UP | P | UP | UP | N | N | N | 45 | 60 | 5,000 | 10 | 15 | --- |
| C1 | P | P | P | P | N | UP | UP | 45 | 60 | 6,000 | 10 | 15 | --- |
| C2 | P | P | P | P | N | P | UP | 45 | 60 | 6,000 | 15 | --- | --- |
| ML | P* | N | N | P* | N | N | N | 45 | 60 | 6,000 | 15 | --- | --- |
| MH | P* | N | N | P* | N | N | UP | --- | --- | --- | --- | --- | --- |

P: PERMITTED USE
UP: USE PERMIT REQUIRED
N: USE NOT PERMITTED
*: LIMITED SCOPE

# IV. HOUSING AND RESIDENTIAL DEVELOPMENT

CONTENTS

Source: City of Willits
Housing Element of the General Plan, February, 1983

## A. Population

### 1. Total Population

All statistics on Tables 1 and 2 for periods between 1940 and 1980, are from U.S. Censuses. The published 1980 census figures are considered preliminary at this time, and may be revised in coming months. Population estimates for the years 1981-2000 were calculated based on State Department of Finance projections. State and County population projections for the years 1980-1986 can be found in Appendix I.

Table 1

Population and Population Ratios

| Year | Number | % of Co. |
|---|---|---|
| 1940 | 1,625 | 5.83 |
| 1950 | 2,691 | 6.59 |
| 1960 | 3,410 | 6.68 |
| 1970 | 3,091 | 6.05 |
| 1980 | 4,008 | 6.01 |
| 1981 | 4,161 | 6.01 |
| 1982 | 4,290 | 6.02 |
| 1983 | 4,423 | 6.03 |
| 1984 | 4,560 | 6.04 |
| 1985 | 4,701 | 6.05 |
| 1986 | 4,816 | 6.06 |
| 1990 | 5,307 | 6.10 |
| 1995 | 5,879 | 6.15 |
| 2000 | 6,523 | 6.20 |

Sources: United States Census Bureau
California Department of Finance
Moore Research Corporation

Figure 1.

# Population Trends

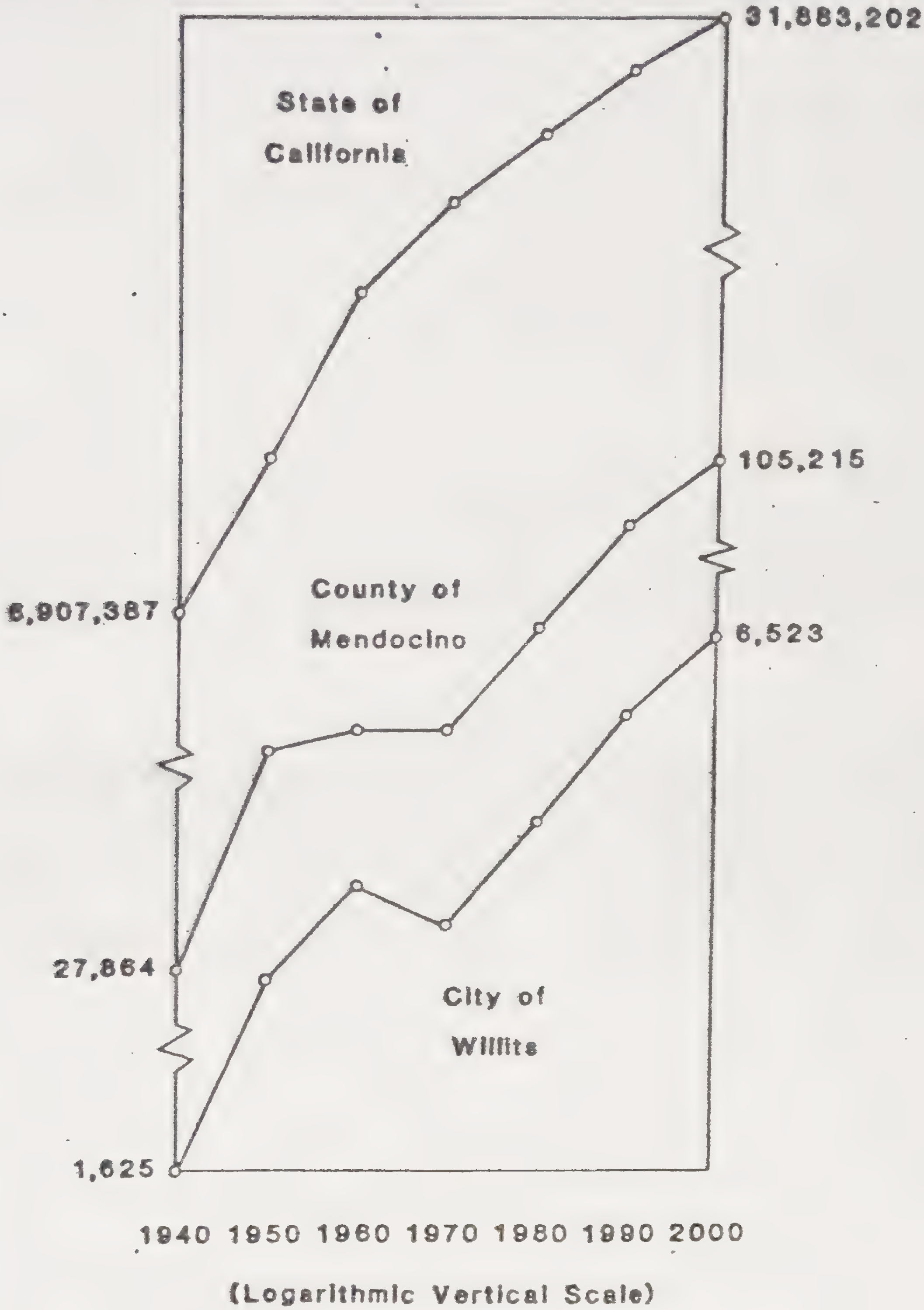


Table 3

Age of the Population

| Year | Percent: Under 18 | Percent: 18 to 64 | Percent: 65 and over | Number: Under 18 | Number: 18 to 64 | Number: 65 and over |
|---|---|---|---|---|---|---|
| 1960 | 38.9 | 52.9 | 8.2 | NA | NA | NA |
| 1970 | 34.4 | 54.8 | 10.7 | 1,064 | 1,695 | 332 |

Source: United States Census Bureau

There are substantially more persons in the 65-and-over category in the City of Willits than statewide, where the proportion was only 5.4% in 1970. This fact should be used in targeting housing assistance for senior citizens.

3. Ethnic Distribution

The concept of race used by the Census Bureau reflects self-identification by respondents. That is, people were classified according to the race with which they identified themselves. In 1970, Mexicans, and other persons of Central or South American origin, were included in the "white" category. In 1980, they were included in the "other" category. This had a substantial effect, dramatically increasing persons in the "other" category at the expense of the "white" category.

Table 4

Ethnic Distribution

| Year | Percent: White | Percent: Black | Percent: Other | Number: White | Number: Black | Number: Other |
|---|---|---|---|---|---|---|
| 1960 | 99.1 | 0.0 | 0.9 | 3,378 | 1 | 31 |
| 1970 | 96.2 | 0.0 | 3.8 | 2,972 | 0 | 119 |
| 1980 | 92.9 | 0.1 | 7.0 | 3,723 | 6 | 279 |

Source: United States Census Bureau

Table 4 shows that the proportion of persons in the "other" category for Willits has almost doubled between the 1970 and 1980 censuses. The major reason for this shift is the change in race definitons between censuses, as mentioned above.

The Black population in Willits is almost non-existent; however, the "other" category contains approximately 7 percent of the population. There is a moderately large Native American population in the city — probably 75 to 100 persons.

## 4. Employment

Table 5 shows employment "by place of residence." It includes people living in the City of Willits, regardless of where they worked. Only employed persons 16 years old or older are included. The table breaks down employment by industry, as categorized by the 1970 U.S. Census of Population and Housing. The "Percent of Total" column shows persons living in Willits and employed in each industrial category, as a percentage of all employed persons living in Willits.

**Table 5**

**Employment by Industry**

| | City of Willits, 1970 | |
|---|---|---|
| | Persons | Percent of total |
| Total* | 1,077 | 100.0 |
| Construction | 31 | 2.9 |
| Manufacturing | 436 | 40.5 |
| Durable goods | 436 | 40.5 |
| Transportation | 49 | 4.5 |
| Communications, utilities, etc. | 38 | 3.5 |
| Wholesale and retail trade | 218 | 20.2 |
| Finance, insurance, business and repair services | 51 | 4.7 |
| Professional and related services | 149 | 13.8 |
| Educational services | 60 | 5.6 |
| Public Administration | 44 | 4.1 |
| Other industries | 61 | 5.7 |

*See text above for important explanations.
Source: United States Census Bureau

## 5. Commuting Patterns

There are no known recent studies describing the commuting patterns of Willits residents. Generally, a large percentage of Willits residents also work in the Willits area. However, in recent years, there has been a marked increase in the number of persons living in Willits but working in Ukiah or other areas. That phenomenon is caused largely by lower housing costs in Willits. Thus, while commuting to work out of the Willits area has shown a marked increase in recent years and may continue to increase if housing in Willits remains cheaper relative to other areas, the bulk of Willits' employed residents still work within or near the community.

# B. Households

### 1. Household Characteristics

As can been seen in Table 6, a marked decline in household size has occurred since 1960, and is projected to continue until the year 2000. Household size

is important, because as households become smaller, more housing units are needed to house a given number of persons.

The combination of an approximately three percent annual population growth rate with a reduction in average household size produces an annual increase of approximately four percent in the number of households. Even if population were to remain constant in Willits, a diminishing average household size would create an increase in the number of households, thus requiring an increase in the number of housing units in the community.

State and County household projections for the years 1980-1986 can be found in Appendix 1.

Table 6

Population by Households

| Year | Total Population | Living in Households* | Average Size of Households* | Total Number of Households* |
|---|---|---|---|---|
| 1960 | 3,410 | 3,406 | 3.18 | 1,072 |
| 1970 | 3,091 | 3,077 | 2.88 | 1,068 |
| 1980 | 4,008 | 3,910 | 2.63 | 1,485 |
| 1990 | 5,307 | 5,172 | 2.40 | 2,155 |
| 2000 | 6,523 | 6,350 | 2.21 | 2,873 |

Sources: United States Census Bureau
Moore Research Corporation

*Excludes those living in group quarters

Another way to look at household size is by showing the distribution of various household sizes in the city, as Table 7 does.

Table 7

Household Size Distribution*

| Year | 1 | 2 | 3 | 4 | 5 | 6 or More |
|---|---|---|---|---|---|---|
| 1960 | 18.8 | 24.2 | 17.3 | 17.7 | 11.7 | 10.4 |
| 1970 | 21.3 | 32.0 | 14.6 | 15.6 | 8.1 | 8.3 |

*Expressed as number of housing units occupied by the specified number of persons, as a percentage of all occupied housing units.

Source: United States Census Bureau

One and two person households increased significantly between 1960 and 1970 and households in every category with more than two persons in a household showed decreases. A similar trend is expected to have occurred since the 1970 census.

2. Income Characteristics

The median household income for the City of Willits is displayed in Table 8. The median is the middle number in a series of numbers. Thus half of the households have incomes the same or higher than the median household income, and half of the households will have incomes the same or lower.

Table 8

Median Income*

| | Amount |
|---|---|
| Household Income | $7,026 |
| Family Income | 9,486 |
| Unrelated Individuals | 2,143 |

*In 1970 (1969 income year), in dollars.

Source: United States Census Bureau

In 1981, the U.S. Department of Housing and Urban Development estimated Mendocino County's median family income to be $21,100. This would have represented a 7.5 percent annual compound growth rate since the 1969 income year, which was the basis of 1970 census data. If the City of Willits experienced the same growth rate in median family income, a median family income of $22,570 would result. However, for purposes of this housing element, the median household income will be used because it more accurately reflects the distribution of income of all households in the City.

Table 9 displays the income distribution of Willits' households. This income distribution was derived from the housing needs numbers developed by the Mendocino Council of Governments and is presented in Table 17. While they maintain that the percentage distribution is probably about the same as it was 12 years ago, new statistics will be prepared based on the 1980 census and should be used in modifying these household projections when the new information is available. State and County income distributions for 1970 can be found in Appendix I.

## Table 9

### Income Distribution of Households*

| | Very low Income | Low and Moderate Income | Above Moderate Income | Total |
|---|---|---|---|---|
| 1970 | 181 | 278 | 609 | 1,068 |
| 1980 | 253 | 386 | 846 | 1,485 |
| Percent Distribution | 17 | 26 | 57 | 100 |

Sources: United States Census Bureau
California Department of Housing and Community Development
Mendocino Council of Governments
Moore Research Corporation

*See Chapter I for a definition of each income level.

### 3. Housing Costs as a Function of Income

The typical standard of housing affordability used by housing analysts measures the number of lower-income households paying more than 25% of their gross income for housing.

The standard most often used by financial institutions in evaluating housing affordability is whether the household is paying less than or equal to 1/3 of its gross income for housing costs, including house payments or rent, property taxes, if any, insurance and utilities. While the 25 percent figure is a more desirable target, it may have outlived its applicability. Given that the higher figure comes closer to matching reality for most households, and that financial institutions do not consider such a household overburdened with debts, it seems that the higher figure may be a more practical standard of housing affordability.

Table 10 estimates affordability problems for lower-income households for the City of Willits in 1980. Lower income households are defined here as households earning less than 80 percent of the median household income for Mendocino County, or less than $7,000.

Table 10

Lower Income Households Paying More Than 25% of Gross Income for Housing, 1980

| | |
|---|---|
| Owner Households | 73 |
| Renter Households | 134 |
| Total lower income households | 207 |

Source: Mendocino Council of Governments

4. Special Housing Needs

a. Handicapped

There are no statistical sources which measure the extent of the handicapped population in the city. Because urban areas typically provide more services to handicapped persons, we assume that Willits has a smaller proportion of handicapped persons than larger metropolitan areas; although, it may have a larger proportion than in truly rural areas such as the unincorporated parts of Mendocino County.

b. Elderly

As was mentioned previously, Willits has nearly twice the proportion of persons 65 years old and over than is the case statewide. In addition it has been estimated that approximately 5-15% of the elderly population have some form of a physical handicap. This would mean anywhere from 17-50 individuals in the City of Willits.[1] Thus, subsidized housing programs for the City of Willits should include housing for elderly and handicapped individuals.

c. Large Families

Willits generally has a smaller proportion of large families (those with 5 or more persons) than is the case either countywide or statewide. Thus, the special housing needs of large families in Willits should not receive special emphasis.

d. Farm Workers

As is shown by the employment tables at the begining of this element, there is an extremely small number of farm laborers living in Willits. Thus, the special housing needs of farm workers in Willits is not an important issue for this housing element.

e. Families with Female Heads of Households

1. Conversation with Ellie Huffman, California Department of Aging, April 13, 1982.

The number of families with female heads generally indicates families with a single income producer, and may indicate special housing needs based on household income, coupled with special childcare needs. Willits has about the same proportion of families with female heads as the County of Mendocino, but both jurisdictions show a lower percentage of families with female heads than the State of California as a whole (8.8 percent for the city compared with 11.5 percent for the state in 1970). On the other hand, the proportion of unrelated individuals who are women is slightly higher for the City of Willits than for the State as a whole (52.6 percent and 50.1 percent, respectively).

While families with female heads of households does not represent an especially large problem in Willits, the level of such households should be considered, particularly as it relates to childcare needs, in the development of subsidized housing in the community.

f. Discrimination

Racial minorities and families with female heads of household comprise very small proportions of the Willits population. Additionally, no occurrences of illegal or unfair discrimination as described in the State's Housing Element Law, were found during the preparation of this element, and no allegations of such discrimination are known to have been reported.

## C. Housing Characteristics of Households

### 1. Overcrowding

Table 11 gives estimates of overcrowding in Willits as of the last two censuses. The 1980 census data are not yet available. We can expect that the percentage of households living in an overcrowded condition will have diminished, just as it did between 1960 and 1970. Still, overcrowding was somewhat more prevalent in Willits in 1970 than either countywide or statewide, where the percentages were 8.7 and 7.9, respectively. If the percentage of households living in overcrowded conditions has diminished to 8 percent, that would mean that there were approximately 125 households living in overcrowded housing conditions in 1981.

Table 11

Overcrowding*

| | Percent of Households | Number of Households |
|---|---|---|
| 1960 | 13.7 | 147 |
| 1970 | 9.4 | 100 |

*Defined as occupied housing units having 1.01 or more persons per room.

Source: United States Census Bureau

## 2. Concentrations of Low-Income Housing

There are not, at present, any major concentrations of low-income housing. There is, however, one existing low-income housing development and another one proposed for the vicinity of Holly Street. That area also contains a moderate amount of housing in need of some rehabilitation work. While the concentration of low-income housing there has not reached the point where additional subsidized housing should be automatically precluded from the area, it has reached the point where other parts of the city should be given preference for such housing. Any additional low-income housing there should be scrutinized in the light of avoiding concentrations of such housing.

Some of the scattered, older residential areas of the city have a moderate level of need for housing rehabilitation work. Should those areas not experience the level of rehabilitation necessary to prevent them from deteriorating further, some pockets of substandard low-income housing concentrations could develop.

As mentioned earlier (Table 9), 17% of Willits' households are in the very low income category.

## 3. Housing Conditions

### a. Age of Housing

Table 12 displays the age of housing in the City of Willits. The data are based on responses to a question asked of a sample of the population during the censuses of 1960, 1970 and 1980. 1980 data were estimated using recent building permit and demolition information. For each of the census years, the number of housing units built in the most recent time period (e.g., 1970 to 1979) includes not only the units built in the decade prior to the census, but also those few units which might have been built in January through March of that census year. Units covered are generally only year-round housing units.

Table 12

Age of Housing*

| | Number of Units | | | Percent |
|---|---|---|---|---|
| | 1960 | 1970 | 1980 | 1980 |
| 1970 to 1979 | — | — | 470 | 29 |
| 1960 to 1969 | — | 134 | 145 | 9 |
| 1950 to 1959 | 305 | 330 | 335 | 21 |
| 1940 to 1949 | 231 | 223 | 230 | 14 |
| 1939 or earlier | 638 | 439 | 420 | 26 |
| Total | 1,174 | 1,126 | 1,600 | 100 |

*Year structure built

Sources: United States Census Bureau
Moore Research Corporation

As can be seen from Table 12 above, over one quarter of the city's housing units, about 420 of them, are estimated to be 43 years old or older. This will have a noticeable effect on building rehabilitation and removal rates in the next 20 years or so.

b. Substandard Housing

Based on a windshield survey, 200-225 housing units are estimated to be in need of rehabilitation. That represents about 14 percent of the City's entire housing stock.

Rehabilitation needs were broken down into two categories: minor and major. Minor rehabilitation was estimated to cost 5 to 25 percent of replacement cost — $3,000 to $15,000 worth of repairs, typically, for a house with a replacement cost of $50,000 to $60,000. Major rehabilitation was estimated to be between 25 and 50 percent of replacement cost — typically more than $15,000, but less than $30,000. Units needing demolition and replacement were those for which the estimated cost of rehabilitation would equal or exceed 50 percent of replacement cost — typically $30,000 or more.

The survey information was recorded on County Assessor's parcel maps. For this reason, the information summarized from the survey is presented for 17 planning sub-areas of the city, each of which is an aggregation of roughly 4 or 5 Assessor's parcel map pages. A map describing those planning sub-areas is included as Figure 2.

The following table presents the results of the housing condition survey. Housing condition information is presented for the 17 planning sub-areas described on Figure 2 and is broken down first by the number of units in residential zones, as opposed to those in non-residential zones. The reason for this breakdown is that many of those units in non-residential zones, that may be in need of rehabilitation, may undergo a conversion to a non-residential use, matching the zoning for the parcel, before or rather

than being rehabilitated for residential use. As a matter of public housing policy, it probably does not make sense to assist in the rehabilitation of a dwelling that could be converted to commercial use at some time in the future.

Table 13

Housing Condition

| | Units in Residential Zones | | | Units in Non-residential Zones | | |
|---|---|---|---|---|---|---|
| Area | Adequate | Need Minor Rehab. | Need Major Rehab. | Adequate | Need Minor Rehab. | Need Major Rehab. |
| 1 | 4 | 1 | 0 | 0 | 1 | 0 |
| 2 | 0 | 3 | 1 | 1 | 0 | 0 |
| 3 | 109 | 1 | 0 | 0 | 0 | 0 |
| 4 | 11 | 4 | 4 | 2 | 5 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 163 | 28 | 1 | 24 | 0 | 0 |
| 7 | 140 | 20 | 5 | 5 | 1 | 0 |
| 8 | 121 | 13 | 0 | 0 | 0 | 0 |
| 9 | 99 | 58 | 0 | 29 | 35 | 0 |
| 10 | 23 | 7 | 0 | 2 | 3 | 0 |
| 11 | 37 | 17 | 0 | 9 | 9 | 0 |
| 12 | 5 | 5 | 0 | 0 | 2 | 0 |
| 13 | 78 | 21 | 1 | 4 | 11 | 0 |
| 14 | 1 | 2 | 0 | 1 | 0 | 0 |
| 15 | 3 | 1 | 0 | 1 | 1 | 0 |
| 16 | 181 | 0 | 0 | 0 | 1 | 0 |
| 17 | 75 | 1 | 0 | 0 | 0 | 0 |
| Total | 1,050 | 182 | 12 | 78 | 69 | 0 |
| Percent | 75.5 | 13.1 | 0.9 | 5.6 | 5.0 | 0.0 |

Note: Refer to text above for important explanations.

Source: Moore Research Corporation

The Housing Condition Table does not show the number of units needing removal and replacement because there were only two units in that category. Keeping in mind that the survey did not include 100% of the city's housing units, we may estimate that there are approximately 2 to 4 units in the city which should be removed and replaced.

180 units in Area 16 were counted to be in adequate condition but are shown as being located on parcels in non-residential zoning. Because those units were relatively new and are not expected to be converted to non-residential uses in the foreseeable future, they were arbitrarily included as being in residential zoning. Elsewhere in this Element, it is recommended that those units and others in similar situations should be rezoned to a residential zoning in order to insure that they remain as part of the city's housing inventory. The remaining tables and figures used in this report assume that those 180 units will be rezoned into residential zoning and

include them in statistics covering units in residential zones.

## 4. Housing Needs

### a. Rehabilitation

We have assumed that typically 80% of the city's housing units would undergo rehabilitation once at an average age of 50 years and that such a typical rehabilitation would extend the life of the structure for about 25 years. We then also assume that 20% of the units will undergo rehabilitation a second time, extending the life of those units by another 25 years. Thus, the average age at which a rehabilitation is done is at 55 years and the average age at which a unit is removed is at 75 years.

Table 14 projects rehabilitation need to the year 2000. Units "now needing rehabilitation" are estimated based on the housing condition survey. It excludes residential structures ~~needing rehabilitation~~ in non residential zones. It is assumed that those structures will either be converted to non-residential uses or will be replaced with non-residential buildings. Only buildings which appeared to be in residential use are included in these estimates of rehabilitation need. The assistance need is estimated to be 50 percent of total need based on estimates by Mendocino Community Development Commission staff.

Table 14

**Rehabilitation Need**

| | 1981 | 1982-1984 | 1985-1989 | 1990-1994 | 1995-1999 |
|---|---|---|---|---|---|
| Now needing rehab. | 219 | — | — | — | — |
| Minor rehab. | 215 | — | — | — | — |
| Major rehab. | 14 | — | — | — | — |
| Total rehab. need | 219 | 38 | 87 | 101 | 135 |
| Units annually | — | 13 | 17 | 20 | 27 |
| Rehab. rate (%) | — | .68 | .82 | .82 | .95 |
| Assistance need | 110 | 19 | 43 | 51 | 68 |
| Units Annually | — | 6 | 9 | 10 | 14 |
| % of total need | 50 | 50 | 50 | 50 | 50 |

Sources: Moore Research Corporation
Mendocino County Community Development Commission

### b. New Construction

Table 15 displays the annual number of new housing units projected to the year 2000. Table 16 breaks down this new construction need in more detail.

Table 15

Number of Housing Units Projected

| Year | Number | Annual Increase | 5-year Increase Number | 5-year Increase Percent |
|---|---|---|---|---|
| 1980 | 1,617 | — | — | — |
| 1985 | 1,952 | 67 | 335 | 3.8 |
| 1990 | 2,294 | 68 | 342 | 3.3 |
| 1995 | 2,650 | 71 | 356 | 2.9 |
| 2000 | 3,057 | 81 | 407 | 2.9 |

Source: Moore Research Corporation

Table 16

New Construction Need

| | 1980-1985 | 1986-1990 | 1991-1995 | 1996-2000 |
|---|---|---|---|---|
| **Additions to Housing Stock** | | | | |
| Homeowner | 181 | 174 | 188 | 213 |
| Rental | 144 | 158 | 158 | 182 |
| Other[1] | 10 | 10 | 10 | 12 |
| Total | 335 | 342 | 356 | 407 |
| (Annual Increase) | (67) | (68) | (71) | (81) |
| (Annual Rate of Increase) (%) | (3.8) | (3.3) | (2.9) | (2.9) |
| **Replacements** | 44 | 61 | 80 | 97 |
| (Annual) | (9) | (12) | (16) | (19) |
| (Annual Replacement Rate) (%) | (.5) | (.6) | (.6) | (.7) |
| **Total New Construction Need[2]** | 379 | 403 | 436 | 504 |
| (Annual) | (76) | (81) | (87) | (101) |
| **New Assistance Need** | | | | |
| Owners | 45 | 43 | 46 | 53 |
| (Annual Amount) | (9) | (9) | (9) | (11) |
| Renters | 77 | 75 | 75 | 87 |
| (Annual Amount) | (15) | (15) | (15) | (17) |
| Total | 122 | 118 | 121 | 140 |

[1]Includes vacant seasonal and migratory units
[2]Additions and Replacements

Note: All dates are as of July of the year.
Source: Moore Research Corporation

5. Housing Needs of Income Groups

Table 17 presents the housing needs numbers by income group for 1980-1985. Base data on income ratios and households received from California Housing and Community Development (see Appendix I) were used to establish the number of very low, low and moderate income families for 1980, and the Mendocino Council of Governments projected income levels and housing needs through 1985 using income level ratios and projected households. It should be stressed that, until the 1980 U.S. Census information on income is available, there are no reliable sources for estimating the distribution of income in the City of Willits. This section will be revised once the census information is available.

Table 17

Housing Needs by Income Group, 1980-1985

| Households by Income Group | New Housing Units Needed |
|---|---|
| Very Low Income | 64 (17%) |
| Low and Moderate Income | 100 (26%) |
| Above Moderate Income | 215 (57%) |
| Total Units | 379 (100%) |

# CHAPTER III - HOUSING SUPPLY CHARACTERISTICS

## A. Production

Table 18 presents annual building permit activity between 1970 and 1980; Table 19 summarizes this activity.

Building permits issued does not directly represent changes in the community's housing stock, both because of non-permit construction or removal, and because certain changes of use may not require a building permit. Conversions may take place either from residential use to non-residential use, or in the other direction, and in some cases they do not require a building permit. However, permits issued are the best source of production data available.

Table 18

Annual Building Permit Activity

| Type of Permit | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Single-family units: | | | | | | | | | | | |
| Construction | 2 | 20 | 26 | 9 | 19 | NA | NA | 33 | 22 | 8 | 4 |
| Demolition | NA | NA | NA | NA | NA | NA | NA | 2 | 4 | 0 | 0 |
| Net change | NA | NA | NA | NA | NA | NA | NA | 31 | 18 | 8 | 4 |
| Multi-family units: | | | | | | | | | | | |
| Construction | 0 | 0 | 15 | 0 | 16 | NA | NA | 28 | 14 | 8 | 2 |
| Demolition | NA | NA | NA | NA | NA | NA | NA | 0 | 0 | 0 | 0 |
| Net change | NA | NA | NA | NA | NA | NA | NA | 28 | 14 | 8 | 2 |
| Total construction | 2 | 20 | 41 | 9 | 35 | 64 | 106 | 61 | 36 | 16 | 6 |
| Total demolitions | 4* | 5* | 4* | 1* | 3* | 3* | 4* | 2 | 4 | 0 | 0 |
| Total net change | -2 | 15 | 37 | 8 | 32 | 61 | 102 | 59 | 32 | 16 | 6 |

*Estimates

Sources: City of Willits Building Inspector
City of Willits 1974 General Plan
California Department of Finance
Moore Research Corporation

The totals and averages below are for the 11-year period from the beginning of 1970 through the end of 1980.

### Table 19

Summary Building Permit Activity 1970 through 1980

| | Units: Annual Total | Units: Average |
|---|---|---|
| Construction | 396 | 36 |
| Demolitions | 30 | 3 |
| Net Change | 366 | 33 |

## B. Type and Tenure

Table 20 compares the distributions of housing types in the City of Willits. Data for 1960 and 1970 were taken directly from the national censuses. Estimates for 1980 were derived by applying the percentage distribution of housing types developed by the State Department of Finance for 1979, to our 1980 estimates of total housing units.

### Table 20

Types of Housing Units*

| | Single-Family | | | Multi-Family | | | Total |
|---|---|---|---|---|---|---|---|
| | Mobilehomes | Other | Total | 2-4 Units | 5+ Units | Total | |
| **1960** | | | | | | | |
| Number | NA | NA | 1,074 | 58 | 42 | 100 | 1,174 |
| Percent | NA | NA | 91.5 | 4.9 | 3.6 | 8.5 | 100.0 |
| **1970** | | | | | | | |
| Number | 54 | 894 | 948 | 65 | 113 | 178 | 1,126 |
| Percent | 4.8 | 79.4 | 84.2 | 5.8 | 10.0 | 15.8 | 100.0 |
| **1980** | | | | | | | |
| Number | 176 | 1,105 | 1,281 | 192 | 120 | 312 | 1,594 |
| Percent | 11.1 | 69.3 | 80.4 | 12.0 | 7.6 | 19.6 | 100.0 |

*Includes only year-round units, as of April.

Sources: United States Census Bureau
California Department of Finance
Moore Research Corporation

Table 21 presents estimates of tenure from the 1960 and 1970 censuses. We have also estimated 1980 tenure and projected owner and renter occupancy rates through the year 2000. There is no source of data that gives any clear indication of how tenure has changed and can be expected to change from the 1970 census. We have shown the owner occupancy rate continuing to decrease, although slowly, through 1990. This trend is a continuation of the 1960 to 1970 change. The home ownership and rental rates were then multiplied by the total number of households (occupied housing units) projected in a previous section of this report.

Table 21

Tenure

| | Owner Occupied | | Renter Occupied | | Total | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | | |
| 1960 | 646 | 60.3 | 426 | 39.7 | 1,072 | 100.0 |
| 1970 | 601 | 56.3 | 467 | 43.7 | 1,068 | 100.0 |
| 1980 | 826 | 55.6 | 659 | 44.4 | 1,485 | 100.0 |
| 1990 | 1,185 | 55.0 | 970 | 45.0 | 2,155 | 100.0 |
| 2000 | 1,580 | 55.0 | 1,293 | 45.0 | 2,873 | 100.0 |

Sources: United States Census Bureau
Moore Research Corporation

## C. Vacancy Rate

The vacancy estimates below are based primarily on 1970 U.S. Census data, and are, therefore, likely to require revision when 1980 census data become available. Preliminary 1980 U.S. Census data were used, however, for the total vacant estimate. The figures for future years are targets or objectives discussed further in other sections of this document.

The rate shown under the "For Sale" row is the homeowner vacancy rate described in the definitions section. The rate under the "For Rent" row is the rental vacancy rate also described. Under the "Other" (year-round) row a rate is given which takes other vacant year-round units as a percentage of all year-round units. The rate underneath the total row is all vacant units as a percentage of all housing units in the city.

The California Statewide Housing Plan, 1977 suggests that a 6 percent rental vacancy rate and a 2 percent homeowner vacancy rate are appropriate. They based these determinations in large part on the mobility of the state's population: there must be enough units vacant at any given time to provide an adequate choice to those persons who are moving and looking for new housing. Because it is believed that rural residents change housing location less frequently than others, 1.5 percent and 5.0 percent are the vacancy rates used as targets in this housing element for home ownership and rental units, respectively. This would mean that there is currently a slight oversupply of vacant housing units in the community.

Table 22

Vacancies

| | 1960 | 1970 | 1980 | 1990 | 2000 |
|---|---|---|---|---|---|
| For Sale | | | | | |
| Number | 8 | 8 | 12 | 18 | 24 |
| Rate | 1.2 | 1.3 | 1.4 | 1.5 | 1.5 |
| For Rent | | | | | |
| Number | 51 | 23 | 52 | 51 | 68 |
| Rate | 10.7 | 4.7 | 7.3 | 5.0 | 5.0 |
| Other | | | | | |
| Number | 43 | 35 | 45 | 64 | 85 |
| Rate | 3.7 | 3.1 | 2.8 | 2.8 | 2.8 |
| Seasonal and Migratory | | | | | |
| Number | 0 | 4 | 5 | 6 | 7 |
| TOTAL | | | | | |
| Number | 102 | 70 | 114 | 139 | 184 |
| Rate | 8.7 | 6.2 | 7.1 | 6.1 | 6.0 |

Sources: United States Census Bureau
Moore Research Corporation

## D. Housing Cost Components

### 1. Ownership Costs

The type of unit in Willits which typically represents housing opportunities available to most households can best be described as a modest, but adequate house, 10 to 25 years old, and not in need of any substantial repairs. Such units are located in the single-family residential areas of the community, on a typical 6,000 square foot lot, and may have a 1,100 to 1,300 square foot floor area. This home will usually contain three bedrooms and may have either one or two bathrooms, more typically one. The typical selling price is $65,000.

Table 23 presents the costs of ownership of this typical house. As the table indicates, an annual income of $34,068 to $44,976 would be necessary to qualify to buy this house. This figure is well above the median household income, as Table 8 in Chapter II, Section B.2 indicates.

Table 23

Typical Housing Ownership Costs

| | | Cost Basis | Amount |
|---|---|---|---|
| I. | Initial Costs | | |
| | A. Down Payment | | |
| | Purchase Price | $65,000 | |
| | Percentage of Purchase Price | 20 | |
| | Down Payment | | $13,000 |
| | B. Finance Charges | | |
| | Points | 2% | $ 1,040 |
| | Origination Fee | | 200 |
| | Credit Report | | Included |
| | TOTAL FINANCE CHARGES | | $ 1,240 |
| | C. Closing Costs | | |
| | Title Insurance | | $ 305 |
| | Escrow | | 160 |
| | TOTAL CLOSING COSTS | | $ 465 |
| | D. TOTAL INITIAL COSTS | | $14,705 |
| II. | Recurring Costs (Monthly Basis) | | |
| | A. Loan Amortization | | |
| | Percent of Purchase Price | 80 | |
| | Loan Amount | $52,000 | |
| | Term, In Years | 30 | |
| | Interest Rate | 16.25 | |
| | Monthly Payment | | $ 710 |
| | B. Insurance | $210/Year | 18 |
| | C. Taxes | 1%/Year | 54 |
| | D. Utilities | | |
| | Water | | $ 15 |
| | Sewer | | 5 |
| | Garbage | | 10 |
| | Energy | | 125 |
| | TOTAL UTILITIES | | $ 155 |
| | E. TOTAL MONTHLY COSTS | | $ 937 |
| III. | Qualification Standards | | |
| | 25 Percent — gross monthly income needed to make housing costs equal 25 percent of gross income | | $ 3,748 |
| | 33 Percent — gross monthly income needed to make housing costs equal 33 percent of gross income | | $ 2,839 |

## 2. Rental Costs

Table 24 summarizes typical housing rental costs. It shows that while housing rental costs are low compared to other parts of the state, a household would have to earn a gross monthly income between $951 and $1,268 in order to fall between the 25 percent and 33 percent qualification standards. These income levels are not out of line relative to typical earnings in the area. In particular, single persons just starting their work careers can easily share a two-bedroom apartment and fall within the two qualification criteria by combining their incomes.

Information on average rents in Mendocino County can be found in Appendix II.

Table 24

Typical Housing Rental Costs: Two Bedroom Apartment

| | | Cost Basis | Amount |
|---|---|---|---|
| I. | Initial Costs | | |
| | Damage and Cleaning Deposit | | $ 100 |
| | Prepaid Rent (Beyond first month) | 1 Month | 275 |
| | TOTAL INITIAL COSTS | | $ 375 |
| II. | Recurring Costs (Monthly Basis) | | |
| | Rent | | $ 275 |
| | Insurance | | 13 |
| | Utilities | | 35 |
| | Water | In Rent | |
| | Sewer | In Rent | |
| | Garbage | In Rent | |
| | Energy | | 35 |
| | TOTAL RECURRING COSTS | | $ 323 |
| III. | Qualification Standards | | |
| | 25 Percent — gross monthly income needed to make housing costs equal 25 percent of gross income | | $1,292 |
| | 33 Percent — gross monthly income needed to make housing costs equal 33 percent of gross income | | $ 951 |

# E. Availability of Sites and Public Facilities

## 1. Site Availability

The housing condition field survey also gathered information concerning vacant and underutilized parcels of land in the city. Because the methodology used was a "windshield survey," the data gathered were subject to some moderate level of error. Those parcels that were considered potentially underutilized

by the professional building inspector who undertook the survey, were measured on the Assessor's Parcel Maps to determine the approximate size of the parcels. The additional densities allowed by the Willits zoning ordinance were then computed for each parcel. The same basic procedure was used to determine the number of units that theoretically could replace the non-residential uses occurring in residential zoning.

A summary of the information gathered on vacant and underutilized land is presented in the table below. Since the housing survey counted approximately 85 percent of the city's housing units, it is possible that vacant and underutilized land shown below are also underestimated.

Table 25

Existing Potential Housing Sites

| | Vacant Residential Land | | | Underutilized Residential Land | | | | Conversion from Non-residential Use | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Area | Parcels | Acres | New Units | Parcels | Acres | Units Now | New Units | Parcels | Acres | New Units |
| 1 | 12 | 41.3 | 104 | 5 | 32.4 | 5 | 52 | 1 | 0.3 | 2 |
| 2 | 0 | 0.0 | 0 | 1 | 1.1 | 1 | 3 | 0 | 0.0 | 0 |
| 3 | 9 | 17.3 | 72 | 19 | 25.1 | 15 | 94 | 4 | 1.6 | 7 |
| 4 | 0 | 0.0 | 0 | 1 | 1.4 | 2 | 68 | 0 | 0.0 | 0 |
| 5 | 0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 |
| 6 | 13 | 5.6 | 33 | 23 | 11.4 | 24 | 46 | 6 | 2.3 | 14 |
| 7 | 8 | 7.1 | 70 | 8 | 6.6 | 9 | 44 | 7 | 2.0 | 27 |
| 8 | 12 | 26.0 | 187 | 53 | 24.1 | 41 | 182 | 0 | 0.0 | 0 |
| 9 | 29 | 7.4 | 105 | 14 | 6.2 | 22 | 63 | 4 | 3.0 | 31 |
| 10 | 10 | 7.7 | 59 | 13 | 10.4 | 13 | 265 | 1 | 0.2 | 6 |
| 11 | 5 | 1.0 | 6 | 5 | 1.2 | 11 | 15 | 4 | 0.9 | 5 |
| 12 | 4 | 5.9 | 40 | 3 | 1.6 | 3 | 7 | 2 | 0.5 | 3 |
| 13 | 7 | 1.8 | 11 | 15 | 5.1 | 14 | 18 | 2 | 0.3 | 2 |
| 14 | 1 | 1.5 | 10 | 1 | 0.8 | 1 | 4 | 0 | 0.0 | 0 |
| 15 | 2 | 3.0 | 12 | 2 | 2.5 | 2 | 7 | 0 | 0.0 | 0 |
| 16 | 0 | 0.0 | 0 | 1 | 0.3 | 1 | 1 | 0 | 0.0 | 0 |
| 17 | 28 | 20.4 | 122 | 1 | 3.9 | 1 | 27 | 0 | 0.0 | 0 |
| TOTAL | 140 | 146.0 | 831 | 165 | 134.1 | 165 | 896 | 31 | 11.1 | 97 |

Note: Refer to text above for important explanations.

Source: Moore Research Corporation

The table above shows that there are approximately 145 to 175 vacant, residentially zoned acres currently within the city limits. That land has a theoretical buildout capacity of 83 to 975 additional housing units. There are approximately 135 to 160 acres residentially zoned that may be underutilized although they currently have housing units on them. If those sites were built out to the full theoretical capacity provided for in the zoning ordinance they could provide 900 to 1,000 additional housing units. Still, some portion of these

additional units probably could not be built because of topographic, lot shape, or other site development constraints. Parcels in residential zoning but currently being used for non-residential purposes could theoretically provide housing sites for approximately 100 additional housing units.

The table below summarizes the theoretical residential build-out capacity of the City of Willits. It utilizes the data presented in the previous table concerning vacant and underutilized parcels. It also subtracts out those existing housing units that are on land currently zoned for non-residential use. Such units are subtracted because it is assumed that the use of the parcels on which they are located will eventually convert to non-residential uses to match the zoning. The data on that table, like those on the previous table, are from the housing condition survey and, therefore, may have underestimated theoretical build-out capacity because the survey did not cover fully 100 percent of housing units and housing sites in the city. An arbitrary adjustment was made in Area 16. These are approximately 180 housing units there that are on non-residential zoning which we have shown to be built out and remain in residential use. This adjustment was made because many of the units are relatively new and it seems highly unlikely that such units will be relaced by commercial uses to match the zoning. In order to insure that those units remain in residential use, it is recommended that their zoning be changed to residential.

Table 26

Residential Build-Out Capacity

| Area | Total Units Now | Total Units Added | Future Total Units | Net Change | % Increase |
|---|---|---|---|---|---|
| 1 | 6 | 158 | 163 | 157 | 2,617 |
| 2 | 5 | 3 | 7 | 2 | 40 |
| 3 | 110 | 173 | 283 | 173 | 157 |
| 4 | 26 | 68 | 87 | 61 | 235 |
| 5 | 0 | 0 | 0 | 0 | 0 |
| 6 | 216 | 93 | 285 | 69 | 32 |
| 7 | 171 | 141 | 306 | 135 | 79 |
| 8 | 134 | 369 | 503 | 369 | 275 |
| 9 | 221 | 199 | 356 | 135 | 61 |
| 10 | 35 | 330 | 360 | 325 | 929 |
| 11 | 72 | 26 | 80 | 8 | 11 |
| 12 | 12 | 50 | 60 | 48 | 400 |
| 13 | 115 | 31 | 131 | 16 | 14 |
| 14 | 4 | 14 | 17 | 13 | 325 |
| 15 | 6 | 19 | 23 | 17 | 283 |
| 16 | 182 | 1 | 182 | 0 | 0 |
| 17 | 76 | 149 | 225 | 149 | 196 |
| TOTAL | 1,391 | 1,824 | 3,068 | 1,677 | 121 |

Note: Refer to text above for important explanations.

Source: Moore Research Corporation

The table above shows that some 1,600 to 1,900 additional housing units could be added to the City's housing stock by using the land currently within city limits to its full theoretical build-out capacity. This would result in some 3,000 to 3,600 dwelling units -- about double the number of units currently in the city. It should be remembered that it is extremely unlikely that full theoretical build-out capacity will ever be reached; however, it does provide a useful measure of existing potential housing sites. The proportion of that theoretical build-out capacity that will, in fact, be utilized will be determined in large part by city policies. Should the city not take steps to encourage the utilization of presently underutilized parcels, or not encouraged the full utilization of existing vacant parcels in the city, population and housing growth could be constrained or additional annexations would be required.

This Housing Element assumes that vacant and underutilized housing sites will be more fully utilized in future years, by a process of "infill" development. Presently, approximately 50 percent of the city's theoretical potential housing sites are being used. It is proposed that approximately two-thirds of these sites will be used by the year 2000.

2. Infrastructure

Limitations on future expansion of the public facilities infrastructure in Willits constitute a major obstacle to the provision of usable housing sites needed to provide for future housing needs. The primary public services and facilities needed to make housing sites available are water, sewer, streets, schools, and parks.

a. Water

Water is presently provided to city residents by a private water utility, Little Lake Water Company. Their main source of water is their reservoir located outside the city. The capacity of the water treatment plant is approximately two million gallons per day. Average use during warm periods of the summer is about 1.75 million gallons per day. The system's storage tanks include one three million gallon tank, which was installed approximately three years ago. There are five other tanks of approximately 100,000 gallons of storage each. The treatment plant currently exceeds its summer peak capacity a couple of days per year.

While treatment storage and distribution facilities appear to be at or near capacity (or somewhat over capacity in some cases) the major weakness in the system occurs at the water source, where pumping stations at the reservoir, because of their location close to the bottom of the reservoir, carry a sizeable amount of sediment and other particulates into the system, overloading the capacity of the treatment plant. This deficiency has led to water quality problems as well as capacity limitations. In January of this year, the State Health Department forwarded a formal request to Little Lake Water Company that the company cease allowing new connections to the system until water quality and service standards can be met.

While the formal request does not constitute a legally binding moratorium on new connections, it has virtually the same effect. Even more importantly,

it has dramatized the fact that future water supply expansion has not been provided for. The water company has not undertaken engineering studies to provide for future capacity expansion and no governmental agency controls, regulates, or participates in any substantial way in the water company's plans for meeting future service needs.

This Element proposes that the city investigate appropriate ways that it can participate in the planning and regulation of the water utility.

b. Sewer

Sewer services are provided by the City of Willits. In May of 1981, the City notified the Water Quality Control Board that it was approaching the dry weather treatment capacity of the sewer plant. The average dry weather design flow of that plant is .64 million gallons per day (MGD). Dry weather inflow reached .71 million gallons per day in May of 1980.

While the peak recorded in May of 1980 was followed by a dropping off of effluent, it served as a warning that the plant's capacity was being approached. The City Engineer estimated that the plant would reach ultimate dry weather capacity in 1985 or 1986.

The City has retained an engineering firm to undertake design work for future expansion of the sewage treatment facilities. While it appears that future capacity requirements can be met in the short- and medium-ranges, long-range facility plans have not been prepared.

c. Circulation

Circulation system problems have not reached a critical stage in Willits, and do not pose an immediate threat to restrictions on future housing development.

## F. Governmental Constraints on Housing Development

### 1. Land Use and Zoning

a. Hillside Development

Some of the hillier parts of the city, especially near its westerly boundary, provide an important opportunity for flexible development standards. Because hilly parcels contain steep slopes, it is generally more expensive to develop them. Furthermore, it can be hazardous (because of mudslides, etc.), as well as environmentally and aesthetically undesirable. It is typical for such areas to be zoned at much lower densities because of these problems. An alternative is to allow the same or even higher densities as in conventional neighborhoods, but require that units be clustered on those parts of the lot that do not have slope or other environmental problems. Such clustering substantially reduces the cost of utilities andd other public facilities, reduces grading and construction costs, and allows environmentally valuable areas with special topographic or vegetative features to be preserved as open space.

Reduced street, curb, gutter and sidewalk requirements in hilly or other environmentally sensitive areas are generally also appropriate. The housing clusters can be smaller than normal individual lots (with density offset by dedicated open space), perhaps with zero lotline or other modified setback requirements. Such situations are also especially appropriate for condominiums or even apartment-like rental units.

b. Multi-Family Development

There are certain provisions of Willits' subdivision, zoning and other development standards which may be discouraging the provision of housing in structures with five or more units. Most notable among those are: the provision making it questionable whether more more than four units per lot may be placed in R-3 zones; the limited amount of land in the city zoned for multi-family residential use; and the limited extent to which planned developments are allowed in the city.

One technique used by some communities to avoid larger concentrations of multiple-family housing (by dispersing them throughout the community), while at the same time reducing housing costs (by increasing density slightly), is to allow interspersing a small number of duplexes in conventional single-family neighborhoods. Corner lots are a special opportunity for the use of duplexes because the structures can be designed so as to provide a sense of privacy and architectural compatibility with other homes in the neighborhood. A typical site configuration provides for the entrances for each of the two units to be on each of the two streets creating the corner. If the community wishes to limit the overall density of a new subdivision, it may still do so, while allowing duplexes on corner lots, by providing that the entire project density not exceed some percentage of the density that would otherwise be allowed in R-1 zones (e.g., 100 percent, 110 percent, etc.).

There are some existing vacant lots in otherwise largely built-up neighborhoods in the city. Some of those lots are substantally larger than the minimum size required for an R-1 lot, but are not quite large enough to be divided into two such lots. Others of those larger lots are shaped or situated in such a way as to make it impractical to divide them. In such cases, especially where such lots are sparsely spread throughout the city, duplexes could be allowed, without altering the basic character of the neighborhood.

Finally, the City's current General Plan, Zoning and Subdivision Ordinances almost totally lack any specific references to condominium-type developments. It is possible that this omission creates a lack of clarity concerning how such developments are to be treated. To avoid this lack of clarity and to insure that such developments are neither inadequately nor overly regulated, this Element recommends Municipal Code Revisions that would apply to condominium developments.

c. Mobilehomes

Senate Bill 1960, adopted in 1980 (Chapter 1142), precludes local governments from prohibiting the installation of mobilehomes on permanent foundations in a single-family zone. It also allows communities to designate

specific lots, and development standards, for mobilehomes, so long as such designations do not exclude mobilehomes from a community.

At present, the Willits Municipal Code allows mobilehomes on individual lots only on a temporary basis. Thus, mobilehome parks provide the only permanent housing opportunities for mobilehomes. Mobilehome parks are allowed as the principal permitted use only in the "C-H Highway Service Commercial" zone. They are allowed with a use permit, in the following other zones "R-4 Apartment-Professional," "C-2 Community Commercial," "M-L Limited Industrial," "M-H Heavy Industrial," "F-P Floodplain Conservation," and "U Unclassified-Interim."

Since no provision is made allowing mobilehomes on permanent foundations in single-family residential zones, the Willits Municipal Code does not comply with S.B. 1960. In order to provide maximum freedom in the location of factory-built housing while still maintaining architectural standards, this Element proposes that certified factory-built housing on permanent foundations be allowed on all single-family residential lots as principal permitted uses, but that they be subjected to carefully prepared architectural standards. These standards should be sufficiently stringent as to avoid architectural incompatibility but should go no further, in order that such housing not be discouraged. The use of this approach avoids having to delineate those specific lots on which certified factory-built housing is to be allowed.

2. Other Development Standards

As mentioned earlier, there is a very large inventory of underutilized parcels in Willits. As is the case in many older communities, zoning and subdivision ordinance standards for lot size and shape, as well as set-back and access requirements pose an impediment to the utilization of those lots. While the City's requirements may be appropriate for all or most new development, modifying those standards in largely built-up areas would allow much more efficient use of city land, and public services. This Element proposes that such standards be developed.

For example, splitting and re-combining lots in developed areas could occur largely at the discretion of the Planning Commission or City Council without being restricted to the same standards applied to new subdivisions. New criteria would have to be developed that would deal with such issues as police and fire safety, privacy of adjoining neighbors, the adequacy of public facilities in the area, etc. Smaller than minimum size lots that were created years ago could be allowed to be developed also under more flexible development standards. The design review process could be considered as a vehicle for insuring adequate design, but with more flexibility.

3. Development Fees

The table below summarizes governmental fees and other charges for housing development. While each development differs in the costs associated with it, governmental costs probably add from $1200 to $1800 per unit in subdivisions of around ten lots.

Table 27

Governmental Development Costs

| | |
|---|---|
| Required for all developments: | |
| Ad Valorem property tax | 1% of value for 2 years |
| Building permit | Varies, $298 for a $55,000 home |
| Real property transfer tax | $.275/$500 of equity transferred |
| Sewer hook-up fee | $750 per unit |
| Subdivision approval | Varies, approx. $1,500 for 10 lots |
| Required for some developments: | |
| Annexation | None |
| Appeal | $ 25 |
| Architectural design review | $ 50 |
| General plan amendment | None |
| Use permit | $100 |
| Variance | $100 |
| Zoning change | $100 |
| Not required: | |
| Construction tax | None |
| Parkland dedication | None |
| School site dedication | None |

4. Permit Processing Procedures

There are three factors that play a very significant role in promoting or discouraging housing development in the community, that usually have no formal recognition in a community's development plans, ordinances, and procedures. They are: the amount of time it takes to process a development through the permit system; the consistency, stability and clarity of local government plans and implementation practices; and the flexibility provided for innovation and special design considerations in special developmental circumstances.

The latter point has already been discussed under Land Use and Zoning. This Element proposes objectives for reducing the time it takes to process development applications. It also proposes that the development process be clarified and simplified through the use of a "development guide." It further recommends that the City's general plan be reviewed in a comprehensive and meaningful way and that the document be used to provide consistency and a rationale in zoning and other decisions so that landowners, developers, and others can predict with a higher degree of surety how the city is likely to deal with their proposed housing developments.

5. Other Governmental Constraints

In 1979, SB-606 (Chapter 947) incorporated into the State's zoning, subdivision, environmental review and water quality laws, wording which required that public agencies' decision-making in those areas include consideration of the effect of the proposed action on meeting housing needs of the region and that those needs be balanced against the public service needs of its residents and

available fiscal and environmental resources. This Element contains a policy implementing that requirement.

## G. Market Constraints on Housing Development

### 1. Land Costs

Information gathered concerning the cost of undeveloped acreage potentially useable for residential development varied according to different sources. It is estimated that undeveloped housing sites in Willits cost between $20,000 and $25,000 per acre under current market conditions.

### 2. Construction Costs

Information on construction costs was also difficult to gather because of the limited amount of construction occurring under present market conditions. Typical single-family construction costs approximately $40 per square foot, or slightly higher. Minimal or economy construction of a moderate-sized single-family home (of approximately 1,400 square feet) costs a minimum of $35 per square foot. Construction of modest units in a multiple-family dwelling (of, say, 25 units) ranges between $36 and $40 per square foot.

### 3. Development Financing

Development financing is extremely scarce in today's market conditions. Most lenders are not issuing any loans for residential construction. Some owner-built construction financing is being provided at 18 percent interest plus a loan fee of 2½ to 3 percentage points. None of the financial institutions contacted would quote a rate for developer financing: however, one or two institutions said that they would consider (very reluctantly) lending to a developer if the development package looked extremely good. Thus we may conclude that development financing is virtully non-existent in Willits in today's housing market.

## H. Residential Energy Conservation

There are three basic levels on which a local government can affect residential energy conservation: in standards and approval of the design of structures and appliances; in subdivision design; and in planning for proper relationships concerning land use and circulation. This section deals with those topics after providing an overview of residential energy consumption patterns.

### 1. Energy Consumption Patterns

The following table describes electricity consumption patterns of Willits' residences. "Users" is an estimate of the number of households hooked up to the electrical system. Because some multiple-dwelling households do not have separate meters (they are "master-metered"), we estimated users by assuming that master-metered customers represented eight housing units. Because a PG&E system average usage statistics probably do not take this adjustment into account, they are probably not totally comparable to city statistics; however, that adjustment would only serve to reduce the systemwide average annual use, and the systemwide figures are already substantially lower than is the case for Willits. The reader should be aware that the costs shown on the

next two tables for gas and electric service does not include taxes also paid with the typical PG&E bill.

Table 28

Residential Electricity Consumption

| Year | City of Willits | | | | | PG&E System Average Annual Use |
|---|---|---|---|---|---|---|
| | Users | Annual Percent Change | | Annual | | |
| | | Cost | Use | Cost | Use | |
| 1970 | 1,066 | - - | - - | 190 | 10,911 | 5,697 |
| 1971 | 1,059 | 15.8 | 10.9 | 221 | 12,099 | 6,048 |
| 1972 | 1,085 | 1.4 | -1.4 | 224 | 11,926 | 6,213 |
| 1973 | 1,118 | 2.7 | -2.9 | 230 | 11,585 | 6,417 |
| 1974 | 1,127 | 10.5 | -6.5 | 254 | 10,837 | 6,260 |
| 1975 | 1,174 | 9.8 | -0.7 | 279 | 10,757 | 6,462 |
| 1976 | 1,256 | 5.5 | -5.9 | 295 | 10,120 | 6,509 |
| 1977 | 1,343 | 10.9 | -11.2 | 327 | 8,988 | 6,408 |
| 1978 | 1,393 | 3.1 | -1.3 | 337 | 8,867 | 6,553 |
| 1979 | 1,475 | -8.6 | - - | 308 | 8,871 | 6,811 |
| 1980 | 1,548 | 33.6 | 7.1 | 411 | 8,245 | 6,535 |
| 10-year change | 482 | 111.1 | -24.4 | 221 | -2,666 | 838 |

Note: Cost is in dollars per user; use is in kilowatt hours per user. See text for important explanations.

Source: Pacific Gas and Electric Company

The table above shows that electrical consumption per household is substantially higher in Willits than throughout the remainder of the PG&E system. PG&E first supplied gas to Willits' customers in December of 1972. There are still many households that do not use gas, but substitute other fuels such as wood or electricity for gas. By 1980, only about two-thirds of the number of households receiving electricity were receiving gas at their residence. The average Willits user used nearly twice as much electricity in 1970 as the PG&E systemwide average user; this declined to about one-quarter more electricity in 1980. From 1970 to 1980, the average residential electrical bill in Willits nearly doubled, while usage dropped by nearly one-quarter.

The table below shows residential gas consumption in Willits since deliveries began at the end of 1972.

Table 29

Residential Gas Consumption

| | | City of Willits | | | | P.G.&E System Average |
|---|---|---|---|---|---|---|
| | | Annual Percent Change | | Annual | | Annual |
| Year | Users | Cost | Use | Cost | Use | Use |
| 1970 | 0 | - - | - - | 0 | 0 | 107.7 |
| 1971 | 0 | - - | - - | 0 | 0 | 121.7 |
| 1972 | - - | - - | - - | - - | - - | 115.7 |
| 1973 | 238 | - - | - - | 135 | 73.6 | 113.4 |
| 1974 | 427 | 20.8 | 15.9 | 163 | 85.3 | 104.5 |
| 1975 | 548 | 23.6 | 6.4 | 202 | 90.8 | 111.1 |
| 1976 | 658 | 0.2 | -4.0 | 202 | 87.1 | 100.8 |
| 1977 | 781 | -16.2 | -11.6 | 170 | 77.1 | 90.5 |
| 1978 | 834 | -11.4 | -0.8 | 150 | 76.5 | 86.9 |
| 1979 | 936 | 23.0 | 4.0 | 185 | 79.5 | 90.4 |
| 1980 | 1,028 | 37.3 | -11.8 | 254 | 70.2 | 81.6 |
| 6-year change | 601 | 55.3 | -17.7 | 90 | -15.1 | -22.9 |

Note: Cost is in dollars per user; use is in million cubic feet per user. See text for important explanations.

Source: Pacific Gas and Electric Company

In the six-year period between 1974 and 1980, gas consumption per user diminished by about 18 percent while the cost of an average gas bill increased by about 55.3 percent. Since gas was first introduced to the city in late 1972, an ever-increasing percentage of Willits' households have hooked-up to gas service.

2. Design of Subdivisions, Structures and Appliances

Some of the energy conservation practices most effective and potentially applicable to Willits are the following:

a. The design of structures and their orientation on lots can be used to promote passive solar heating and natural cooling.

b. Shading, both by drapes to trap heat loss or prevent undesired solar heating, and by the use of deciduous plants to provide shade during the summer and allow sunlight to reach the home during the winter, can be used to improve energy conservation efficiency.

c. Leaks in a structure, such as holes, inadequate insulation, and the use of energy-wasting window glass, can be effectively reduced.

d. Energy-efficient appliances and fixtures, e.g., energy-efficient water heaters and furnaces, lights with dimmer switches and timers, etc., can be installed.

e. Space heating and cooling devices (especially heating in Willits) can be optimized for energy savings.

f. Water flow reduction devices can be installed in showers and faucets. This approach has the advantage of not only diminishing the amount of energy needed to pump and heat water, but also reduces water consumption itself, which in turn, could have beneficial impacts on water supply and treatment capacities in the city, as well as on sewage disposal systems.

Presently, designers and builders of new housing in Willits typically do not contact PG&E in the earlier stages of development design regarding energy conservation. Furthermore, the energy efficiency of subdivision design does not play a significant role in the City's permit review process. The design stage is particularly critical in determining energy consumption, because once the subdivision is in place, there is far less of an opportunity to retrofit to achieve significant energy savings.

This Element proposes that developers and designers be required to contact PG&E in the design process for information on making the development more energy-efficient. The City will then consider the energy conservation measures adopted as one of its criteria in determining permit approval.

It may be possible to minimize a contractor's compliance with this section by allowing those homes that meet PG&E's "energy conservation home" standards to be approved without further formal review of energy conservation issues.

In order to ensure that city staff and policymakers (including the Planning Commission and perhaps City Council) have the skill to carry out the above proposals, city staff should investigate what free or very low-cost energy conservation information and training programs could be made available for city workshops.

The City Municipal Code presently contains minimal standards and provisions which encourage energy-efficient design and discourage energy-wasting design. The City should seriously consider the development of solar access and other ordinances for this purpose.

Finally, to insure that energy costs have their proper impact in home rental and purchase decisions, this Element proposes that persons selling or renting housing be required to provide a copy of a PG&E home energy audit which has been prepared within three years prior to the proposed sale or lease, and that the audit must be supplied to interested parties prior to entering into an agreement to sell or to rent the unit.

3. Relationship of Land Use and Circulation

While energy conformation obviously cannot be the only concern in community design, it should be one of the main considerations. Reduced car usage is one of the primary benefits of proper community planning. Higher density housing should be provided close to employment and shopping centers. Pedestrian and bicycle use should be encouraged by providing for their safe and convenient use (e.g., through bicycle and pedestrian paths). It appears from an examination of current city plans that these features are not present to the extent that they could be.

Units with common walls, e.g., duplexes, apartment houses, and condominiums, can be made energy-efficient by reducing exterior walls which can leak heat. Housing in hilly areas can be clustered on gently sloping southern exposures. The utilization of appropriate, not overly wide street widths can make communities more compact. This reduces vehicular travel and has a beneficial effect through the shading provided by deciduous trees. While these factors alone should not dictate zoning or street widths, they should be included in the considerations used to develop the community's land use and circulation plans.

# CHAPTER IV - EXISTING PROGRAMS

## A. Resources

### Federal and State Programs

The primary financial contributor to new housing units for low and moderate income households has been the Federal Department of Housing and Urban Development (HUD). HUD's two main programs are: 1) Section 8, under which new low-income rental units are built, or existing ones rehabilitated by private developers; and 2) Section 202, under which new elderly/handicapped rental housing is built.

In addition, the Farmers Home Administration (FmHA) operates two programs in rural areas: 1) Section 502, which provides loans for the construction, purchase or rehabilitation of owner-occupied, single-family dwellings for low and moderate income households; and 2) Section 515, which provides loans to housing sponsors for the contruction of rental and cooperative housing for senior citizens and low and moderate income families.

Finally, through the Community Development Block Grant Program, funds are available for land banking and rehabilitation.

The State also provides funding sources for the new construction of low and moderate income housing. The California Housing Finance Agency (CHFA) has funds for loans and new construction. The Marks-Foran Residential Rehabilitation Act of 1973 allows cities, counties and housing authorities to issue tax exempt revenue bonds for the purpose of financing rehabilitation loans. A final potential source is the California Department of Housing and Community Development (HCD). HCD has a Rental Housing Construction Program which provides funds, through local agencies or CHFA, for the development of new rental units by private, non-profit, or public agency sponsors.

## B. The City of Willits

This section describes existing and recent housing assistance programs.

The Mendocino County Community Development Commission carries out numerous housing assistance activities throughout the area, including the City of Willits. Their capacity for obtaining funding and carrying out housing assistance programs is well developed and proven. The Rural Communities' Housing Development Corporation (RCHDC) works in the City and has provided rental housing units. There are other agencies in the county performing housing services (e.g., North Coast Opportunities, Native American housing assistance organizations, etc.) most of which coordinate their activities to some degree or another with the County Community Development Commission.

Because of the administrative capacity and generally successful performance record enjoyed by the Communty Development Commission, the City of Willits should cooperate closely with that agency in coordinating housing assistance programs in the city. That cooperation should include referral of proposed housing assistance projects to the CDC staff for review and comment as well as continuing staff contacts to coordinate housing activities.

Assistance to improve housing affordability of renters occupying existing housing units is provided primarily through the federal "Section 8" Program for assistance in making housing payments by low-income renter households. Approximately 60 households are presently being assisted through that program in the City of Willits. Slightly less than one-half of those households are elderly persons. The county's housing element proposes expansion of the Section 8 Program over the next four or five years in order to address this critical housing need.

The main program used to assist in the rehabilitation of low-income rental units is the Community Development Block Grant (CDBG) Program. Additionally, Section 8 funds may be provided to undertake moderate rehabilitation programs in conjunction with rental assistance. There are currently roughly forty units of this type funded countywide with approximately seventeen of them scattered in the greater Willits area. The county's housing element proposes to use CDBG funds to rehabilitate approximately 18 rental housing units in the next few years. This county has passed a resolution to be included in the State Deferred Payment Loan Program which may provide roughly 75 units of rehabilitation assistance for rental housing units countywide. The CDC is presently looking for funds which can be used to provide the required matching funds for this program.

CDBG funds are also used to provide rehabilitation assistance for owners. The county's housing element proposes to undertake 30 such rehabilitations in coming years. The State Deferred Payment Loan Program may also be used to undertake about 66 owner-occupied rehabilitation projects countywide if matching funds can be found. Farmers Home Administration (FmHA) Section 523-502 assistance for self-help home ownership and rehabilitation is proposed in the county housing element to provide approximately 8 units of housing rehabilitation and new construction assistance over the next few years.

The construction of new units to assist in meeting the needs of low-income rental households is undertaken by FmHA Section 515 funds. Recently 26 units of such housing was constructed in the Holly Heights area of the city. Sixteen units more are proposed to be constructed under that program in the same area. The federal Department of Housing and Urban Development (HUD) Low-Income Public Housing Program also provides funds to construct new assisted housing units for renters. Sixty such units for low-income elderly rental households should be completed by the summer of 1982 in the southwest part of town. Those units will be owned and operated by the County Housing Authority, a branch of the CDC. An additional 50 units are proposed for low-income family rental assistance for funding in 1985; however, no site has yet been found for this proposed new construction.

The county's housing element also calls for three units of California Housing Finance Agency homeowner home improvement funding in 1984.

Other programs sponsored by the CDC assist low-income households by providing counseling or technical assistance in the area of mortgage delinquencies and defaults, budgeting, tenant-landlord relations, and technical assistance for owner-builders and rehabilitation. The CDC monitors state and federal funding programs on a continuing basis and applies for, either on their own behalf or on behalf of cities and other agencies in the county, funding under numerous programs.

Table 30 presents a summary of the assisted units which already exist in Willits as of December 31, 1981, and the goals for new construction and additional assistance through 1985.

Attainment of these goals depends entirely on levels of funding available in any given time. Mendocino County and Willits will actively pursue the housing unit goals as early as possible so that maximum use of programs are realized while funds are available.

Finally, Table 31 presents a summary of the Section 8 Existing Program in Mendocino County as of January 1, 1980.

Table 30

Assisted Units for Owners and Renters

| | 1981* | 1982 | 1983 | 1984 | 1985 | Total Increase | Total Assisted By 1986 |
|---|---|---|---|---|---|---|---|
| Owners: | | CDGB: 30 units<br>Section 523/502: 8 units | | CHFA/HOHI: 3 units | | 41 | 41 |
| Renters: | Section 8: 61 units<br>Section 515: 26 units | Section 8: 4 units<br>CDBG: 18 units<br>Section 515: 16 units<br>HUD LIPH: 60 units | Section 8: 3 units | Section 8: 4 units | Section 8: 3 units<br>HUD LIPH: 50 units | 158 | 245 |

* Includes previous assistance and existing units.

Source: Mendocino County — Cities Planning Council, Staff estimate from Mendocino County Community Development Commission and Rural Communities Housing Development Corporation

Explanation of Abbreviations:

CDBG: Community Development Block Grant
Section 523/502: FmHA Self-help homeownership and rehabilitation
CHFA/HOHI: California Housing Finance Agency/Homeowner Home Improvement Program
Section 8: Low income rental assistance — Housing assistance payment contracts
Section 515: FmHA rural rental housing program
HUD LIPH: HUD Low income public housing (requires Article 34 referendum)

Table [illegible]

Section 8 — Existing Housing

Monthly Status Report

(Combined Inland and Coast)

January 1, 1980

| Categories | Grand Total | E/D/H Total | Bedroom Size | | | | Family Total | Bedroom Size | | | | | | Lg. Fam. | Fem. Hd. | Area Location | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | M | | 1 | 2 | 3 | 4 | 5 | M | | | U | W | NC | SC | UA |
| 1. HUD Unit Allocation | 400 | 136 | 25 | 87 | 24 | | 264 | 18 | 151 | 68 | 25 | 2 | | | | | | | | |
| 2. Number of Applications | 44 | 0 | 0 | 0 | 0 | | 44 | 2 | 29 | 11 | 2 | 0 | 7 | 13 | 33 | 19 | 7 | 11 | 2 | 5 |
| 3. Currently Eligible Apps | 371 | 122 | 4 | 98 | 20 | 12 | 249 | 25 | 141 | 75 | 7 | 1 | 30 | 83 | 260 | 182 | 62 | 58 | 10 | 59 |
| 4. Number of Certificates Issued | 15 | 1 | 0 | 1 | 0 | 0 | 14 | 2 | 8 | 2 | 2 | 0 | 3 | 4 | 8 | 7 | 0 | 4 | 0 | 4 |
| 5. Expired Certificates | 26 | 2 | 1 | 0 | 1 | 0 | 24 | 5 | 12 | 5 | 2 | 0 | 3 | 6 | 18 | 10 | 2 | 6 | 2 | 6 |
| 6. Active Certificates | 389 | 135 | 22 | 88 | 25 | 4 | 254 | 14 | 149 | 69 | 21 | 1 | 34 | 91 | 276 | 122 | 55 | 97 | 15 | 100 |
| 7. HAP Contracts Approved | 40 | 15 | 3 | 11 | 1 | 1 | 25 | 1 | 15 | 8 | 1 | 0 | 2 | 9 | 31 | 13 | 4 | 9 | 0 | 14 |
| 8. HAP Contracts Terminated | 30 | 12 | 2 | 8 | 2 | 0 | 18 | 2 | 10 | 6 | 0 | 0 | 2 | 6 | 20 | 10 | 1 | 4 | 0 | 15 |
| 9. Current HAP Contracts | 365 | 135 | 22 | 88 | 25 | 4 | 230 | 12 | 136 | 61 | 20 | 1 | 27 | 82 | 263 | 114 | 52 | 90 | 14 | 95 |
| 10. Very Low Income Family | 260 | 109 | | | | | 151 | | | | | | | | | | | | | |
| 11. Assisted in Place | 243 | 95 | | | | | 148 | | | | | | | | | | | | | |
| 12. Average Gross Family Contribution | | | 88 | 87 | 112 | | | 90 | 101 | 116 | 145 | 148 | | | | | | | | |
| 13. Average Contract Rent | | | 150 | 168 | 205 | | | 159 | 213 | 254 | 303 | 272 | | | | | | | | |
| 14. Rents over FMR | 14 | 4 | 1 | 3 | 0 | 0 | 10 | 0 | 6 | 3 | 1 | 0 | 2 | 4 | 10 | 6 | 0 | 5 | 0 | 3 |

Source: Housing Authority Mendocino County

# V. ECONOMIC DEVELOPMENT

## EMPLOYMENT IN WILLITS BUSINESSES

| | |
|---|---|
| Executive, Administrative, Managerial | 145 |
| Professional Specialty | 117 |
| Technicians and Related Support | 30 |
| Sales | 187 |
| Administrative Support, Including Clerical | 222 |
| Private Household | 23 |
| Protective Service | 27 |
| Service, Except Protective and Household | 192 |
| Farming, Forestry and Fishing | |
| Precision Production, Craft and Repair Services | 219 |
| Machine Operators, Assemblers and Inspectors | 129 |
| Transportation and Material Moving | 114 |
| Handlers, Equipment Cleaners, Helpers and Laborers | 100 |

Source: United States Census Bureau

# MAJOR EMPLOYERS IN WILLITS AREA

| NAME | PRODUCT |
|---|---|
| Remco Hydraulics (Abex Corp) | Hydraulic & pneumatic steel components |
| Little Lake Industries (Div. of Amcord) | Redwood furniture |
| Harwood Products | Redwood lumber products |
| Louisiana-Pacific | Fir lumber products |
| Masonite (Western Lumber Div.) Ukiah | Finger jointed molding |
| Cutter Lumber Co. | Pallet manufacturing |
| Adco Redwood, Inc. | Specialty redwood products |
| 101 Redwood, Inc. | Small dimension wood products |
| Microphor Inc. | |
| Timber Realization, Calpella | |
| Advanced Mfg. and Development Precision Sheet Metal and Machine Shop | |

Major non-manufacturing businesses:

| | |
|---|---|
| Willits Unified School Dist. | Educational facilities |
| Calif. Divisions of Forestry and Transportation | State services |
| The City of Willits | City services |
| Howard Memorial Hospital | Health care services |
| Caltrans | State Highway services |
| Safeway Stores, Inc. | Grocery |
| Bank of America | Banking |
| Bank of Willits | Banking |
| U.S. Post Office | Postal services |

## Labor Force

| | % of Pop. of L.F. Age | Total Labor Force | | | Civil. Lab. Force | |
|---|---|---|---|---|---|---|
| | | Persons | Part. Rate | Non wk./ Wk. Ratio | Persons | Part. Rate |
| City of Willits: | | | | | | |
| 1960 | 68.4 | 1,325 | 56.8 | 1.57 | 1,325 | 56.8 |
| 1970 | 69.1 | 1,162 | 54.4 | 1.63 | 1,162 | 54.4 |
| 1980 | 71.9 | 1,756 | 60.5 | 1.28 | 1,756 | 60.5 |
| County of Mendocino: | | | | | | |
| 1960 | 70.2 | 17,741 | 49.5 | 1.88 | 17,569 | 49.3 |
| 1970 | 70.7 | 18,826 | 52.1 | 1.68 | 18,632 | 51.9 |
| 1980 | 73.6 | 29,150 | 59.3 | 1.29 | 28,925 | 59.2 |
| State of California: | | | | | | |
| 1960 | 71.1 | 6,435,656 | 57.5 | 1.44 | 6,135,341 | 56.4 |
| 1970 | 70.4 | 8,338,493 | 59.4 | 1.37 | 7,992,168 | 58.4 |
| 1980 | NA | NA | NA | NA | 11,103,000 | 64.9 |

Sources: United States Census Bureau
California Employment Development Department
Moore Research Corporation

## Employment Status

| | Civilian Employed Persons | Civilian Unempl. Persons | Civilian Unempl. Rate | Active Military |
|---|---|---|---|---|
| City of Willits: | | | | |
| 1960 | 1,237 | 88 | 6.6 | 0 |
| 1970 | 1,077 | 85 | 7.3 | 0 |
| 1980 | 1,529 | 227 | 12.9 | 0 |
| County of Mendocino: | | | | |
| 1960 | 16,123 | 1,446 | 8.2 | 172 |
| 1970 | 17,233 | 1,399 | 7.5 | 194 |
| 1980 | 25,075 | 3,850 | 13.3 | 225 |
| State of California: | | | | |
| 1960 | 5,761,433 | 373,908 | 6.1 | 300,315 |
| 1970 | 7,484,690 | 507,478 | 6.3 | 346,325 |
| 1980 | 10,358,000 | 745,000 | 6.7 | NA |

Sources: United States Census Bureau
California Employment Development Department
Moore Research Corporation

## POPULATION & HOUSEHOLDS

### Willits Trade Area

### 1970-1985

| Year | POPULATION City of Willits | POPULATION Willits Trade Area | POPULATION Mendocino County | HOUSEHOLDS City of Willits | HOUSEHOLDS Willits Trade Area | HOUSEHOLDS Mendocino County |
|---|---|---|---|---|---|---|
| Historical Data | | | | | | |
| 1970 | 3,091 | 10,264 | 51,101 | 1,068 | 3,438 | 16,538 |
| 1978 | 3,855 | 12,250 | 60,460 | 1,390 | 4,635 | 21,934 |
| 1979 | 4,031 | 12,890 | 63,900 | 1,455 | 4,800 | 23,200 |
| Projections | | | | | | |
| 1980 | 4,008 | 13,500 | 64,300 | 1,485 | 5,100 | 23,400 |
| 1985 | - | 15,600 | 73,100 | - | 5,900 | 26,600 |

Sources: 1970 Census of Population & Housing
The State Department of Finance's annual estimates for Cities and Counties; and their population and household projections for Counties.

Note: The Willits Trade Area is defined as consisting of the Willits, Covelo, and Leggett/Laytonville County census divisions

Wage and Salary Employment by Industry

| | County of Mendocino | | |
|---|---|---|---|
| | 1972 | 1980 | Change |
| Total* | 100.0 | 100.0 | -- |
| Ag., Ag. services, forestry and fisheries | 6.0 | 6.2 | +0.2 |
| Non-agricultural | 94.0 | 93.8 | -0.2 |
| Construction and Mining | 2.8 | 3.1 | +0.3 |
| Manufacturing | 30.1 | 21.9 | -8.2 |
| Lumber and wood products | 22.6 | 14.0 | -8.6 |
| Other manufacturing | 7.4 | 7.9 | +0.5 |
| Transportation and public utilities | 5.7 | 4.7 | -1.0 |
| Wholesale trade | 2.5 | 2.7 | +0.2 |
| Retail trade | 15.7 | 18.8 | +3.1 |
| Finance, insurance, and real estate | 2.6 | 3.5 | +0.9 |
| Services | 13.8 | 18.7 | +4.9 |
| Government | 20.8 | 20.4 | -0.4 |

*See text above for important explanations.
Source: California Employment Development Department.

TAXABLE RETAIL SALES TRENDS
Willits, Mendocino County, S.F. Bay Area
1970-1977

| Year | Willits (Mil) | Mendocino County | San Francisco Bay Area (9 Co) (Bil) |
|---|---|---|---|
| 1970 | $9.3 | $70 | $6.8 |
| 1971 | 10.5 | 81 | 7.5 |
| 1972 | 13.9 | 99 | 8.6 |
| 1973 | 18.5 | 116 | 9.8 |
| 1974 | 18.1 | 125 | 10.6 |
| 1975 | 19.2 | 135 | 11.5 |
| 1976 | 24.9 | 160 | 13.2 |
| 1977 | 31.4 | 193 | 15.6 |
| 1978 | 36.4 | 227 | 18.7 |
| % Change 1970-78 | 291% | 224% | 175% |

Source: State Board of Equalization Annual Reports

TOTAL RETAIL EXPENDITURES
CITY OF WILLITS

(Taxable Transactions in Thousands of Dollars)

| | 1975 | | 1979 | |
|---|---|---|---|---|
| | Retail Outlets | Total Retail Sales | Retail Outlets | Total Retail Sales |
| Retail Stores | | | | |
| Apparel stores.................... | 4 | 500 | 10 | 1,048 |
| General merchandise stores........ | 7 | 2,136 | 9 | 2,908 |
| Drug stores....................... | 2 | | 2 | |
| Food stores....................... | 7 | 2,399 | 9 | 4,446 |
| Packaged liquor stores............ | 2 | | 1 | |
| Eating and drinking places........ | 20 | 2,046 | 20 | 3,064 |
| Home furnishings and appliances... | 6 | 264 | 6 | 525 |
| Bldg. material & farm implements.. | 5 | 5,698 | 11 | 16,144 |
| Auto dealers & auto supplies...... | 6 | 1,630 | 8 | 3,684 |
| Service stations.................. | 14 | 3,603 | 10 | 4,670 |
| Other retail stores............... | 22 | 886 | 27 | 1,907 |
| **Retail Stores Totals..........** | 95 | 19,162 | 113 | 38,396 |
| **All Other Outlets............** | 65 | 1,441 | 108 | 4,003 |
| **Totals All Outlets...........** | 160 | 20,603 | 221 | 42,399 |

Source: State Board of Equalization

COMMERCIAL ESTABLISHMENTS

City of Willits

1979

| Type of Store | Main Street: North | Main Street: South | Shopping Center | Other Locations | Total |
|---|---|---|---|---|---|
| Supermarkets | | 1/7,000 | 1/33,000 | | 2/40,000 |
| Other Food Stores | 4/8,000 | - | - | - | 4/ 8,000 |
| Drug Stores | 1/7,000 | - | 1/ 1,000 | - | 2/ 8,000 |
| Liquor Stores | 2/2,600 | - | - | - | 2/ 2,600 |
| Service Stations | 8/8,600 | 4/3,600 | - | - | 12/12,200 |
| Eat & Drink Estabs. | 10/10,600 | 5/10,200 | 1/ 1,000 | 4/9,600 | 20/37,400 |
| Gen. Merchandise | 5/19,800 | - | 1/ 5,400 | 1/9,400 | 7/34,600 |
| Apparel | 7/30,000 | - | - | 5/4,600 | 12/34,600 |
| Specialty | 10/14,600 | 4/4,300 | - | 3/3,900 | 17/22,800 |
| Furniture, Appliances | 5/5,100 | 2/3,100 | 1/10,000 | - | 8/18,200 |
| Building Materials | 3/5,600 | 2/6,400 | 1/ 2,000 | - | 6/14,000 |
| Auto Dlrs./Parts | 3/9,200 | 7/19,000 | - | - | 10/28,200 |
| **TOTAL** | 58/127,100 | 25/53,600 | 6/52,400 | 13/27,500 | 102/260,0 |

Note: 3/7,000 means establishments with 7,000 square feet of floor area. The division between Main Street North and Main Street South is at Highway 20.

# VI. CIRCULATION AND TRANSPORTATION

CONTENTS PAGE

## CIRCULATION AND TRANSPORTATION

### A. Highway Transportation

Highways are the most important transportation facilities in and adjacent to the City of Willits. Two State maintained highways provide the most direct links between Willits and other communities. The County maintained road system ties in with several of the City maintained streets. Although the functions of most of these facilities vary by jurisdiction, they are interfaced to form the basic circulation pattern for Willits and vicinity. The entity responsible for maintaining each of the highway types and the nature of short range planning being done is considered below.

#### 1. State Highways

Willits is served by U.S. 101, the major highway in northwestern California. This route occupies a north/south alignment through central Willits. This important facility links Willits with Eureka and smaller communities to the north as well as Ukiah and the population centers of the San Francisco Bay Area to the south.

State Highway 20 links Willits to Fort Bragg and other small communities on the Coast. State Highway 20 provides the only paved access to the Coast from U.S. 101 between Ukiah and Leggett. The junction of State Highway 20 with U.S. 101 occurs south of the City's central business district.

Maintenance and improvement of U.S. 101 and all State Highways is the responsibility of the State, acting through Caltrans. Capital projects which are scheduled for these highways are identified in the State Transportation Improvement Program (STIP). The STIP is a short range plan (5 year) which lists information on State highway projects throughout California. Project type, location, limits, description, costs, and year programmed are the primary information categories contained in the STIP. The STIP is revised annually to remove completed projects, add new projects, and make other necessary adjustments. This document is the basis for short range planning for State Highways in theRegional Transportation Plan.

#### 2. County Roads

There are several County roads which interface with the Willits street system. One of the more important County roads in the area is Sherwood Road.

Primary access to the Brooktrails Subdivision near Willits is provided via Sherwood Road. This route, through a linkage with Fort Bragg Sherwood Road, also provides access to Fort Bragg and the Coast.

Hearst-Willits Road, a continuation of Commercial Street, provides access to central and eastern portions of Little Lake Valley. Southeast portions of the Little Lake Valley is serviced via East Hill Road. The City maintained street system meets East Hill at the southeastern City Limits.

Several other minor County roads are located adjacent to the City maintained street system. Most of these roads are extensions of the City system and serve primarily local traffic.

The County Road Program provides information on scheduled projects and funding for County maintained roads. This document is utilized in much the same manner as is the STIP by the State. It is revised annually to delete completed projects, add new projects, and make necessary corrections. Roadway and bridge improvements for all Mendocino County roads are identified in the Road Program Project description, location, programming year, estimated costs, and funding source are the most essential components of the Road Program. This document is the primary source for short range planning information for the County maintained road system. A Short Range Action Plan for Mendocino County will soon be developed which will incorporate the Road Program information into a unified document addressing all transportation modes.

3. <u>City Streets</u>

The City of Willits is responsible for maintenance and improvement of several arterial collector, subdivision, and minor streets within the City corporate limits. These streets serve the highway transportation needs of industry, commerce, tourism, and local residents.

Funding for improvements to the Willits street system has traditionally come from two primary revenue sources. SB 325 funds are allotted each year from the State through the Mendocino Council of Governments. These funds are utilized for both street maintenance and capital improvements. Gas Tax revenues, the other major funding source, are typically used for maintenance, engineering, and construction. Minor infusions of General Fund monies sometimes supplement SB 325 and Gas Tax funds for capital improvement purposes.

In recent years, the dependability of SB 325 monies as a funding source for street improvements has been eroded. The use of SB 325 funds for transit purposes has resulted in a substantial decrease in the amount allotted to the City of Willits. At the same time, there is a decreasing possibility that shortfalls can be mitigated by increased City General Fund contributions towards Capital Improvement projects. The current and continuing fiscal difficulties which are impacting Willits and most other local governments will most likely result in the unavailability of General Fund monies for those capital projects which have been traditionally funded from other sources.

A short range Capital Improvement Schedule for the City of Willits is not considered feasible at this time. The problems which are recognized in developing such a program are two fold: 1. Uncertain funding (both existing and new sources) virtually eliminates the possibility of attaining viable projections of available funds. 2. The City lacks staffing needed to assemble and administer such a program.

Many needed improvements to the Willits street system have been identified. In 1978, a Needs and Deficiencies study for the entire City Transportation System was completed. (Page VI-6 ). The study identified over $1.8 M (1978 Dollars) in deficiencies to the existing street system. Two new facilities were identified to ease congestion in the north-south corridor. These routes add another $1.02 M (1978 Dollars) to the street system needs list.

A Capital Improvement Program for the City of Willits is not considered feasible at this time. Street improvement projects are selected each year based on needs and available funds. Available funds in Fiscal Year 1982/83 are expected to be approximately $70,000. A funding level of $70,000 is expected to continue for the next several years unless supplemented by SB 215 funds or other new sources. Each year as the budget is being developed, candidate projects garnered from the Needs and Deficiencies list will be considered for funding. A list of current projects and anticipated future available funds is shown on Page VI-8.

Obviously, the ratio of available funds to identified needs is so low as to render fundable only the most needed projects each year. Those projects which have been completed since 1978 have been deleted from Table I. In addition, there are several "spot improvements" which are mentioned in the body of

the report. These "spot improvements" are:

1. Crossing protection at all at-grade railroad crossings within the City.

    a. East Valley Street
    b. San Francisco Avenue
    c. Blosser Lane

2. Safety Improvements at Shell Lane/ Baechtel Road intersection.

3. Holly Street slide repair.

Capital Improvement projects scheduled for Fiscal 1982/83 include overlays on three streets and spot improvements on several others. Wearing surfaces will be replaced on Easy Street, West Mendocino Avenue, and Franklin Avenue. Individual cost breakdowns for each of these projects are shown in Table II. Available funds for these improvements amount to approximately $70,000.

4. <u>Summary of Factors Affecting Capital Improvements on City Streets</u>

Consideration:

1. Present revenue sources are unreliable for projecting capital expenditures. A figure of $70,000/year for capital projects is being used until new revenue sources are available.

2. Capital projects are selected from 1978 Needs and Deficiencies Study or from new projects warranting immediate attention.

3. City lacks staffing to develop and funding to implement, a capital improvement plan.

CITY OF WILLITS
NEEDS AND DEFICIENCIES STUDY (1978)
STREET PROJECTS

| STREET | PROJECT TYPE | COST (1978) |
|---|---|---|
| **Select System** | | |
| Baechtel Road | curb, gutter, sidewalk, overlay, misc. | $ 78,300 |
| East Commercial Avenue | curb, gutter, sidewalk, reconstruction | 148,500 |
| Sherwood Road | miscellaneous | 550 |
| Mill Street | curb, gutter | 13,125 |
| North Street | curb, gutter | 9,450 |
| School Street | curb, gutter | 863 |
| Pine Street | curb, gutter, sidewalk, overlay | 12,150 |
| Holly Street | curb, gutter, sidewalk, overlay | 54,750 |
| Locust Street | curb, gutter, sidewalk, overlay | 51,825 |
| Walnut Street | curb, gutter, sidewalk, overlay | 35,250 |
| East Valley Street | curb, gutter, sidewalk, overlay | 26,062 |
| Humboldt Street | overlay | 22,500 |
| | Sub-Total Select System------------------ | $ 453,325 |
| **Non-Select System** | | |
| Pine Street | curb, gutter, sidewalk, overlay | $ 12,000 |
| Maple Street | curb, gutter, sidewalk, overlay | 13,650 |
| Hazel Street | curb, gutter, sidewalk, reconstruction, miscellaneous | 36,550 |
| Manzanita Avenue | curb, gutter, sidewalk, reconstruction | 31,500 |
| Poplar Street | curb, gutter, sidewalk, miscellaneous | 15,362 |
| Magnolia Avenue | curb, gutter, sidewalk, miscellenous | 27,925 |
| Madrone Street | curb, gutter, sidewalk, miscellaneous | 20,050 |
| State Street | curb, gutter, sidewalk, overlay, miscellaneous | 10,300 |
| North Lenore Avenue | curb, gutter, sidewalk, overlay | 85,500 |

| Non-Select System cont. | PROJECT TYPE | COST (1978) |
|---|---|---|
| Sewer Plant Road | overlay | $ 18,000 |
| South Lenore Avenue | curb, gutter, sidewalk, overlay | 65,325 |
| Marin Street | curb, gutter, sidwalk | 12,000 |
| Alameda Avenue | curb, gutter, sidewalk, overlay | 18,000 |
| San Francisco Avenue | curb, gutter, sidewalk | 8,025 |
| Sandy Lane | miscellaneous | 550 |
| Elm Street | miscellaneous | 550 |
| South Street | curb, gutter, sidewalk, reconstruction | 67,500 |
| East Oak Avenue | curb, gutter, sidewalk, reconstruction | 64,500 |
| West Oak Avenue | curb, gutter, sidewalk, overlay | 18,000 |
| Redwood Avenue | curb, gutter, sidewalk, overlay | 36,825 |
| McKinley Street | curb, gutter, sidewalk, overlay | 35,250 |
| Bush Street | curb, gutter, sidewalk, reconstruction | 18,000 |
| North Street | sidewalk | 6,750 |
| Hawthorne Avenue | sidewalk, overlay | 13,500 |
| Brookside | sidewalk, miscellaneous | 10,050 |
| California | curb, gutter, sidewalk, reconstruction | 25,500 |
| Penn | curb, gutter, sidewalk, reconstruction | 22,500 |
| | Sub-Total Non-Select System----------- | $ 693,662 |
| **Minor Street System** | | |
| Van Lane | curb, gutter, sidewalk, miscellaneous | $ 35,050 |
| Tuttle Lane | curb, gutter, sidewalk, miscellaneous | 15,550 |
| Pearl Street | curb, gutter, sidewalk | 13,875 |
| | Sub-Total Minor System---------------- | $ 64,475 |
| | GRAND TOTAL------------------ | $1,211,462 (1978) |

CITY OF WILLITS

STREET IMPROVEMENT PROJECTS

1982 - 1987

| STREET | PROJECT LIMITS | DESCRIPTION OF PROJECT | COST | YEAR PLANNED |
|---|---|---|---|---|
| EASY STREET | REDWOOD TO MENDOCINO | OVERLAY | $ 5,000 | 82/83 |
| W. MENDOCINO AVE. | SCHOOL TO EASY | OVERLAY | $20,000 | 82/83 |
| FRANKLIN AVENUE | MAIN TO BLOSSER | OVERLAY | $30,000 | 82/83 |
| VARIOUS | | SPOT IMPROVEMENTS | $15,000 | 82/83 |
| UNDETERMINED* | ---- | REHABILITATION | $70,000 | 83/84 |
| UNDETERMINED* | ---- | REHABILITATION | $70,000 | 84/85 |
| UNDETERMINED* | ---- | REHABILITATION | $70,000 | 85/86 |
| UNDETERMINED* | ---- | REHABILITATION | $70,000 | 86/87 |

*Determination of actual projects for implementation is made each year based upon consideration of available funds and needed projects. A Needs and Deficiencies Study identifies needed street projects costing $1.2 million (1978 estimate). Since available funds are sufficient to allow only modest rehabilitation of the existing system, there is little chance of implementating the identified projects without the acquisition of a significant new funding source for local capital projects.

## B. Non-Motorized Transportation

Non-motorized transportation facilities are those improvements which may be utilized by pedestrians, bicyclists, and equestrians. Three levels of government -- State, County, and City have some form of involvement in Nonmotorized transportation in the Willits area.

### 1. State Highways

There are limited non-motorized transportation facilities under State jurisdiction in the Willits area. Where these accommodations do exist, they share existing State highway right-of-way with motorized traffic.

Accommodations for pedestrians along the State Highway system near Willits is restricted to widening or sidewalks across bridges. Sidewalks along U.S. 101 in Willits are under the jurisdiction of the City of Willits.

Bicycles are permitted on both State Highways in the Willits vicinity. On freeway sections south of Willits, the emergency parking lane is available for bicycle traffic. On non-freeway sections the through lanes as well as shoulders are available for bicycle use.

As is the case for the State highway system which they share, pedestrian and bicycle projects are normally programmed in the State Transportation Improvement Program (STIP).

### 2. County Roads

Approved equestrian and hiking trails share the roadway with three County roads in the Willits area. The only trail from Willits to the Coast follows Sherwood Road, CR 311, to Hearst-Willits Road, CR 306, and from that point into Fort Bragg. Sherwood Road also provides hikers and equestrians a parallel route to U.S. 101 between Willits and its northern terminus just north of Longvale.

Equestrian and hiker access to the east of Willits is provided for on Hearst-Willits Road, CR 306. A trail has been established along this road from its western terminus at East Commercial Street to its northeast terminus several miles from Willits.

A third trail in the Willits vicinity extends from Hearst-Willits Road to Tomki Road, CR 237D, along Canyon Road, CR 308. The Canyon Road trail links Willits to Redwood Valley and several other trails that have been established in the Ukiah area.

There are few pedestrian improvements incorporated with County maintained roads. Most pedestrian facilities are within subdivisions adjacent to incorporated areas of the County. Other pedestrian facilities may be built by the County in limited locations wher pedestrian volumes and other warrants are satisfied.

Several Bicycle Routes are established for Willits and vicinity in the Mendocino County General Bikeway Plan. Bicycle routes are approved for three County maintained roads near Willits. County Bicycle Routes on Sherwood Road, CR 311, Hearst-Willits Road, CR 306, and East Hill Road, CR 301, have been established to interface with several routes on Willits City streets. As of this time, no physical improvements to these roads have yet been accomplished to enhance their ability to accommodate bicycle traffic.

Short range improvements on or adjacent to County roads are identified each year in the County Road Program. In most cases, alternate modes of transportation are also considered for incorporation into County road construction and reconstruction projects.

3. <u>City Pedestrian and Equestrian Facilities</u>

Improvements to pedestrian facilities are normally incorporated with improvements to adjacent streets. Most new pedestrian facilities are now being privately built and enter the Willits Street System through the street dedication process. Budget constraints dictated that few pedestrian improvements can be planned utilizing City funding. Unless other revenue sources can be identified, only those improvements to pedestrian facilities which will remedy hazardous conditions will be considered for funding.

The 1978 Needs and Deficiencies Study for the City of Willits identifies numerous needed improvements to the City's transportation system. Included as a component of the Street Improvement Needs are extensive improvements to adjacent pedestrian facilities. In all, $332,500 of the needed $1,851,500 for the Willits Street System is actually needed for sidewalk. A list of remaining projects and costs (1978 dollars) from the Need Study is included in this plan as Table 1 in the Highway Transportation Section.

There are no equestrian facilities within the City of Willits. Once, again, budget constraints require that funds available for transportation be utilized in the most cost effective manner. This reality virtually eliminates the possibility of funding for what is primarily a recreational facility. If a specific funding source or grant monies become available in the future, then candidate projects will be considered.

4. City Bicycle Facilities

There are several bicycle routes within the City of Willits which were identified in the Mendocino County General Bikeway Plan. This plan was developed in the 1977-78 Work Program to establish a basis upon which local implementation programs could be developed. Bicycle routes, in and adjacent to Willits which were adopted by MCOG are as follows:

1. U.S. 101 - Entire length in Mendocino County
2. S.H. 20 - Entire length in Mendocino County
3. Sherwood Road - Entire length in City
4. Mill Creek Road - Entire length
5. West Commercial Street - Entire length
6. East Commercial Street - Entire length
7. West Mendocino Avenue - Spruce Street to School Street
8. Pine Street - Entire length
9. Mill Street - Entire length
10. Walnut Street - Entire length
11. Holly Street - Entire length
12. East Valley Street - Entire length
13. South Street - Entire length
14. San Francisco Avenue - Boscabelle Avenue to South Lenore Street
15. Baechtel Road - Entire length

16. Spruce Street - Entire length

17. School Street - Pine Street to West Commercial Street

18. Humboldt Street - Main Street to East Commercial Street

19. Boscabelle Avenue - Entire length

20. South Lenore Avenue - Entire length

21. Central Street - Entire length

22. Railroad Avenue - San Francisco Avenue to East Valley Street

A regular source of funding for the implementation of bicycle route projects does not exist. Implementation of approved projects is primarily dependent upon grant funding. Some bicycle facilities, are however, incorporated into new street projects. According to standard practice, the non-motorized mode is considered in the design of all new city streets. The overall effect on implementation of bicycle routes is minimal, since the majority of routes are planned on existing streets.

Two of the most utilized bicycle grant programs in Mendocino County are the State Bicycle Lane Account (B.L.A.) and the Transportation Development Act provisions for pedestrian and bicycle facilities (SB 325). Applicants for B.L.A. funding must compete on a Statewide basis for approximately $360,00 per year in available funds. The Regional Transportation Planning Agency for Mendocino County, MCOG, makes available 2% of SB 325 funds for bicycle projects each year. In 1982/83 $17,760 was available through MCOG.

Since bicycle project implementation dependent upon funding from competitive grants, a short range improvement program cannot be developed. Projects which may be built in the future will be selected from General Bikeway Plan routes. There are no plans to implement any of the planned routes during the short term (5 years) covered by this plan.

The first Bikeway Project in the City of Willits was constructed in 1982. This project constructed a Class I/II Bikeway from Main Street easterly to a high-use City park. SB 325 funding was utilized for this project.

5. Summary of Factors Affecting Non-Motorized Transportation

Considerations:

1. No regular source of bicycle project funding exists, thereby making implementation totally dependent upon grant funding.

2. The Needs and Deficiencies Study identified extensive needs for pedestrian facilities.

3. Only pedestrian projects considered to be hazards will be funded.

4. Pedestrian and bicycle needs are considered in the design of new streets.

5. Future bicycle projects will be chosen from Mendocino County General Bikeway Plan; however, priorities have not been established.

## C. Transit

The Mendocino Transit Authority (MTA) provides inter-city public transportation between Willits and other Mendocino County communities. Service to Ukiah and vicinity is available several times daily, schedules being adjusted to conform to seasonal demand. A Willits-Covelo route is scheduled three times per week. Public transportatin to Fort Bragg and the Coast is available through B. & H. Transportation, a private operator, under contract with MTA.

Most Willits operations are conducted from a Park & Ride facility on City property in downtown Willits. The Park& Ride facility provides transit users with vehicle storage space while utilizing MTA services.

Short Range planning information is prepared each year by Mendocino Transit Authority. It is in the form of a 5-year Transit Plan which addresses capital improvements, operating deficits, scheduling adjustments, funding and other valuable planning information. The 5-Year Transit Plan is the source document utilized in updating the transit component of the Regional Transportation.

## D. Air Transportation

Willits Municipal Airport is the sole public aviation facility serving Willits, Little Lake Valley, and Brooktrails. It is owned and maintained by the City of Willits.

### 1. Willits Municipal Airport

Willits Municipal Airport is located approximately six miles north of the City of Willits. Approximately 42 based aircraft contribute to 6500 operations recorded each year. The fueling facilities at the airport offer both standard grades of aviation fuel and other services are available from a fixed-base operation.

The City of Willits operates the airport on an enterprise basis. Revenue derived from hangar rentals, tie-down fees, fuel sales profits, and other approved fees is deposited into the Airport Enterprise Fund. Routine operation of the airport is thus funded from airport revenues flowing through the Airport Enterprise Fund. Salary for the Airport Manager, utilities, maintenance, and aviation fuel purchases are examples of routine operational expenses funded through the Airport Enterprise Fund.

Improvements to the airport of a capital nature generally require funding levels beyond the capability of either the Airport Enterprise Fund or the Willits General Fund. State and Federal grants are sought to provide capital necessary to implement needed projects. The Willits General Fund is often utilized to provide the required match when grants are secured.

Willits Municipal Airport receives an annual grant from California Aid to Airports (CAAP). Each year $5,000 is received from CAAP for capital improvement and maintenance of capital improvements. Because of revenues sufficient to operate and maintain the airport, this yearly grant is reserved for capital improvements only.

In 1978, the City of Willits accepted a Needs and Deficiencies Study of the Transportation System. This was prepared by a consultant and addressed several modes of transportation, including air. The Needs and Deficiencies Study suggested the following improvements at Willits Municipal Airport:

1. Regrade runway to eliminate vertical curve.

2. Develop new hangar space.

3. Construct taxiway.

4. Install a Visual Approach Slope Indicator (V.A.S.I.).

Elimination of the vertical curve on the runway as recommended in the Needs and Deficiencies Study is not now practical without extensive external funding. Preliminary estimates place the cost at near 3.55 million to correct this deficiency.

Hangar space is being provided by the City through the Airport Enterprise Fund. The third and fourth deficiencies noted in the Study are addressed in the Capital Improvement Program. Other projects, some of which were not anticipated in 1978, complete Capital Improvement requirements through 1987. This program is shown on Page VI-16. It should be noted that the entire program is dependent on grant funding.

2. Summary of Factors Affecting Capital Improvements at Willits Municipal Airport

Considerations: 1. The Enterprise Fund collects revenues generally sufficient for operation and maintenance.

CITY OF WILLITS
MUNICIPAL AIRPORT
CAPITAL IMPROVEMENT PROGRAM

| | PROJECT DESCRIPTION | FUNDING SOURCE | COST | YEAR |
|---|---|---|---|---|
| 1. | Construct taxiway from intersection to North end runway "16" approximately 1100 ft. Includes grading, paving (2") and striping. | Grant | $170,000 | 82/83 |
| 2. | Purchase and install Visual Approach Slope Indicator (V.A.S.I.) | Grant | 60,000 | 83/84 |
| 3. | Pave existing dirt area west of present hangars to property line and south of FBO hangar, and install approximately 35 new tie downs, including base and striping. | Grant | 120,000 | 83/84 |
| 4. | Resurface runway. | Grant | 174,400 | 84/85 |
| 5. | Purchase approximately 40 acres of land between airport and Brooktrails property for expansion and to prevent residential encroachment. | Grant | 80,000 | 84/85 |
| 6. | Construct emergency perimeter road suitable for 4-wheel drive vehicles along property line; road to be improved to all weather surface at future date. | Grant | 110,000 | 85/86 |
| 7. | Construct taxiway from intersection to South end of runway "34", approximately 1900 ft. Includes grading, drainage, lighting, paving and striping. | Grant | 210,000 | 86/87 |
| 8. | Purchase and install perimeter fence on west side for security (after property purchase). | Grant | 90,000 | 86/87 |
| 9. | Extend runway approximately 1200 feet at 75 feet width. Includes fill, base, asphalt, runway lights, and drainage. Also lower north end of runway approximately 20 feet (contingent upon A.D.A.P. funding). | Grant | 3,550,000 | 86/87 |

2. State and Federal grants are required to fund Capital Improvements.

3. Willits General Fund monies are often utilized to match grants.

4. Identified needs far outweigh resources; particularly for runway modifications.

5. The Capital Improvement Program is entirely dependent upon grant funding.

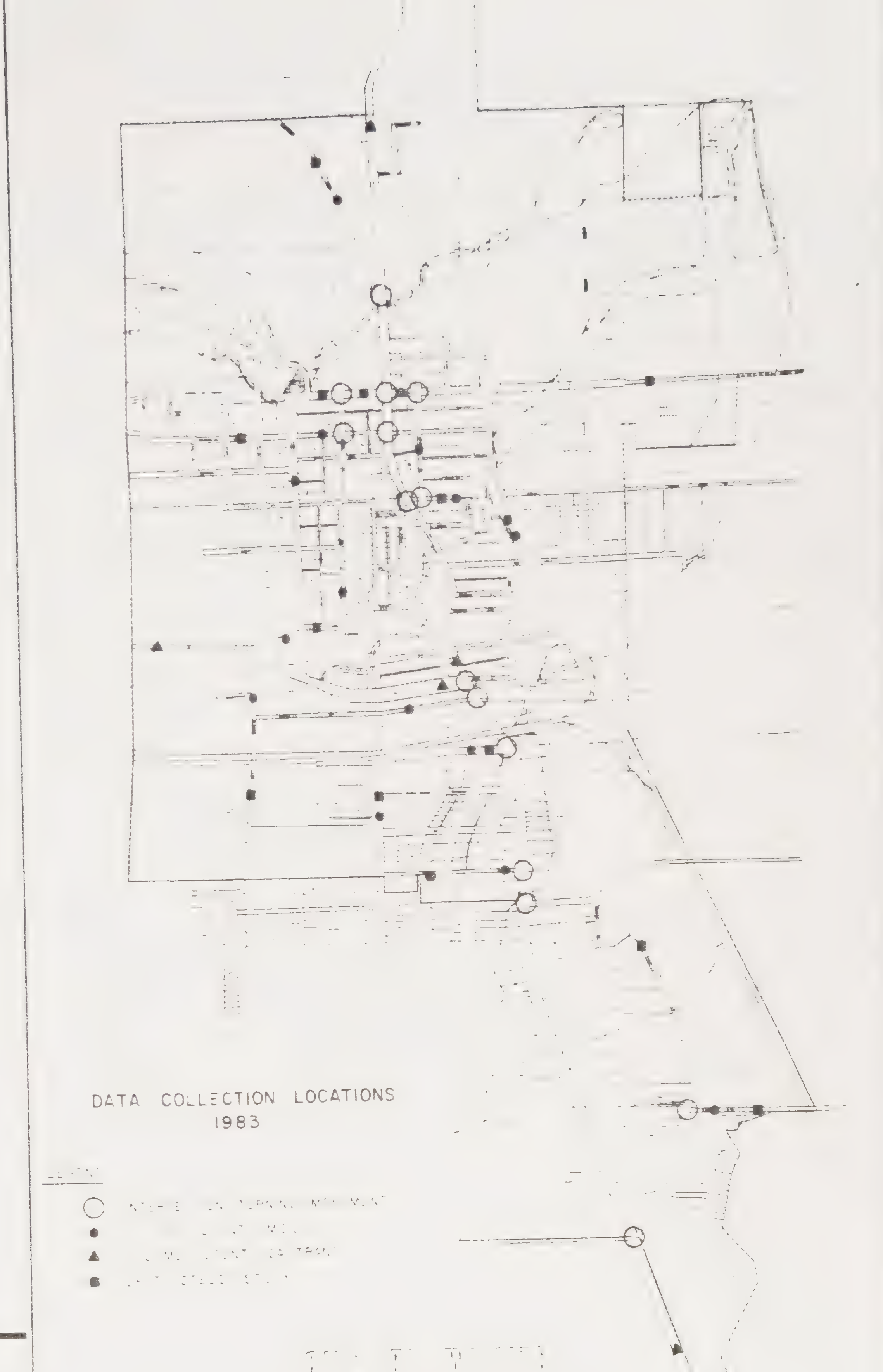
## E. Rail Transportation

Northwestern Pacific Railroad operates between Marin County and the Eureka/Arcata area. This short line railroad occupies an alignment roughly paralleling U.S. 101 through eastern Willits. The Northwestern Pacific does not provide passenger service, but does provide the only freight service between the San Francisco Bay Area and Mendocino and Humboldt Counties.

California Western Railroad operates a passenger train between the cities of Willits and Fort Bragg. In excess of 140,000 passengers per year are served. Approximately 80% of these passengers are carried during the tourist season which runs from June through September.

Passenger service has been available on the California Western Railroad since 1904. In recent years, the service has been primarily recreation oriented. Since a great deal of the attractiveness of California Western to tourists is a result of its use of original facilities and trains, it is doubtful that new improvements are being considered.

Short range improvements which are likely to involve State or Federal funds are identified in the State Rail Plan. Information on privately financed capital improvements is available only through management of Northwestern Pacific Railroad and California Western Railroad.




MENDOCINO COUNTY, CALIFORNIA

## STATE HIGHWAY TRAFFIC VOLUMES
## WILLITS 1979 - 1982

| HIGHWAY | LOCATION | VOLUME (VPD) 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|
| U.S. 101 | M.P. 45.17 - South City Limits | 9,500 | 9,900 | 7,900 | 9,000 |
| U.S. 101 | M.P. 46.36 - South of Jct US 20 | 14,300 | 20,000 | 16,000 | 17,100 |
| U.S. 101 | M.P. 46.36 - North of Jct US 20 | 15,300 | 18,800 | 15,000 | 15,800 |
| U.S. 101 | M.P. 47.23 - North City Limits | 7,600 | 7,900 | 6,300 | 6,900 |
| S.R. 20 | M.P. 32.44 - West City Limits | 2,700 | 2,700 | 1,850 | 1,950 |
| S.R. 20 | M.P. 33.16 - Jct. U. S. 101 | 3,700 | 3,700 | 2,900 | 3,050 |

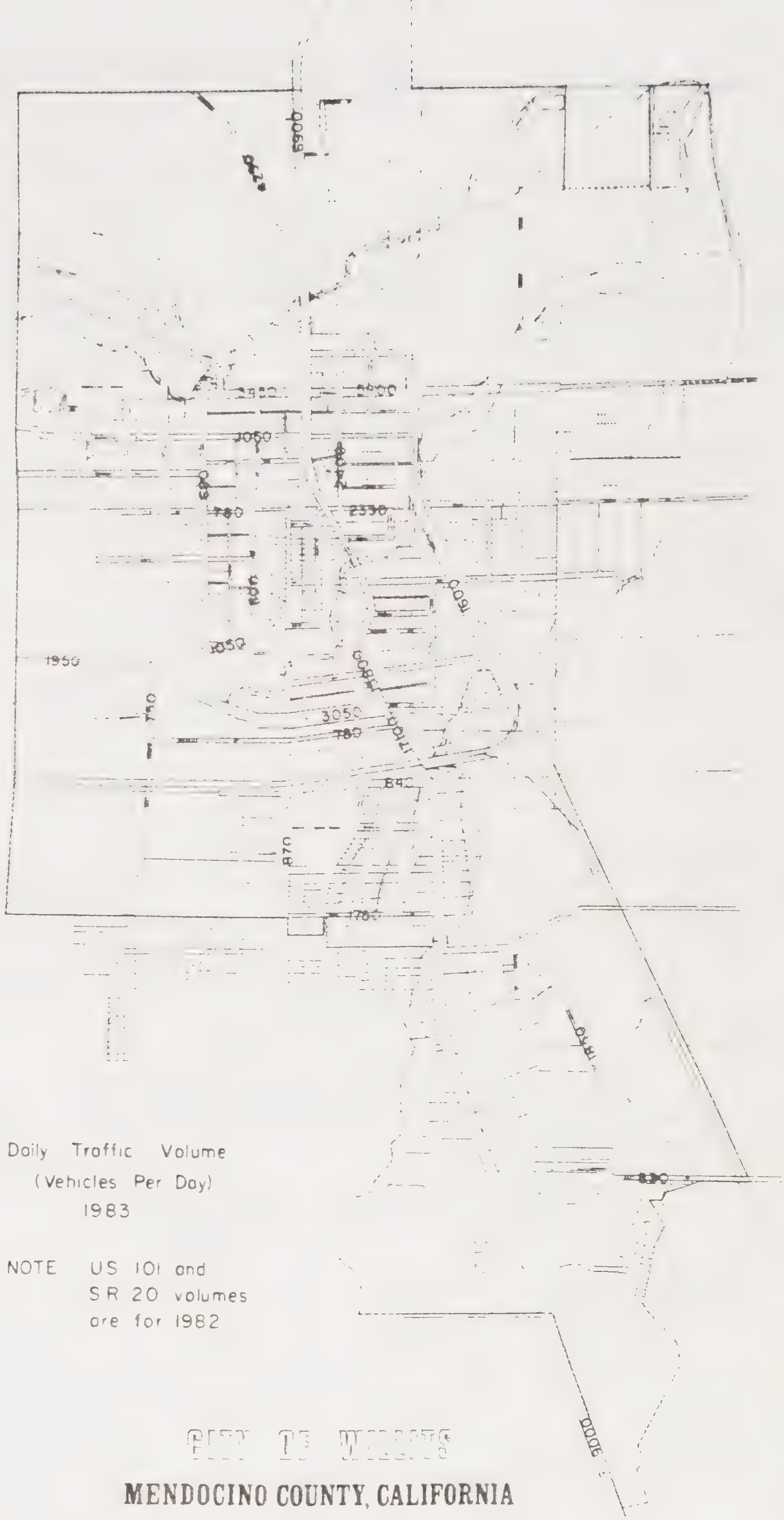
## 1979 MAIN STREET VOLUMES
## (U.S. 101 - WILLITS)

| SEGMENT LIMITS | VOLUME (VPD) |
|---|---|
| Holland to Muir Mill | 9,710 |
| Baechtel to Holly | 16,160 |
| Franklin to Flower | 16,240 |
| Flower to San Francisco | 15,710 |
| San Francisco to Valley | 17,000 |
| Mendocino to Commercial | 14,940 |
| Commercial to Sherwood | 11,830 |
| Sherwood to Casteel | 11,100 |

WILLITS VOLUME DATA*

| STREET | SEGMENT LIMITS | 1979 ADT | 1983 ADT | PERCENT CHANGE |
|---|---|---|---|---|
| Baechtel | Main to East Hill | --- | 1850 | |
| Blosser | City Limits to Franklin | --- | 750 | ---- |
| Central | South To Oak | 2950 | --- | ---- |
| Coast | Flower to Mill | 1070 | 1050 | -1.9% |
| East Commercial | Main to Humboldt | 4760 | 5800 | +21.8% |
| West Commercial | School to Main | --- | 3450 | ---- |
| Franklin | Blosser to Main | --- | 750 | ---- |
| East Hill | Baechtel to City Limits | --- | 830 | ---- |
| Holly | Locust to Main | 1890 | 1750 | -7.4% |
| Humboldt | East Valley to Commercial | --- | 2400 | ---- |
| Locust | Holly to Walnut | 530 | 870 | +64.2% |
| Mendocino | North to Main | --- | 1050 | ---- |
| Mill | Coast to Laurel | 340 | 500 | +47.1% |
| North | Pine to Mendocino | --- | 680 | ---- |
| Pine | North to Mill | --- | 780 | ---- |
| Railroad | San Francisco to E. Valley | --- | 1600 | ---- |
| Sherwood | Main to City Limits | --- | 4250 | ---- |
| South | Main to Central | 2090 | --- | ---- |
| East Valley | Main to Railroad | --- | 2350 | ---- |
| East Valley | Railroad to Lenore | 1530 | --- | ---- |
| Walnut | Locust to Main | --- | 840 | ---- |

*Volumes are expressed in Vehicles Per Day (VPD)


6900
2900
3050
2330
780
1600
1950
750
3050
780
840
870
1700
9000
Daily Traffic Volume
(Vehicles Per Day)
1983
NOTE US 101 and
SR 20 volumes
are for 1982
CITY OF WILLITS
MENDOCINO COUNTY, CALIFORNIA

# VEHICLE VOLUME SUMMARY

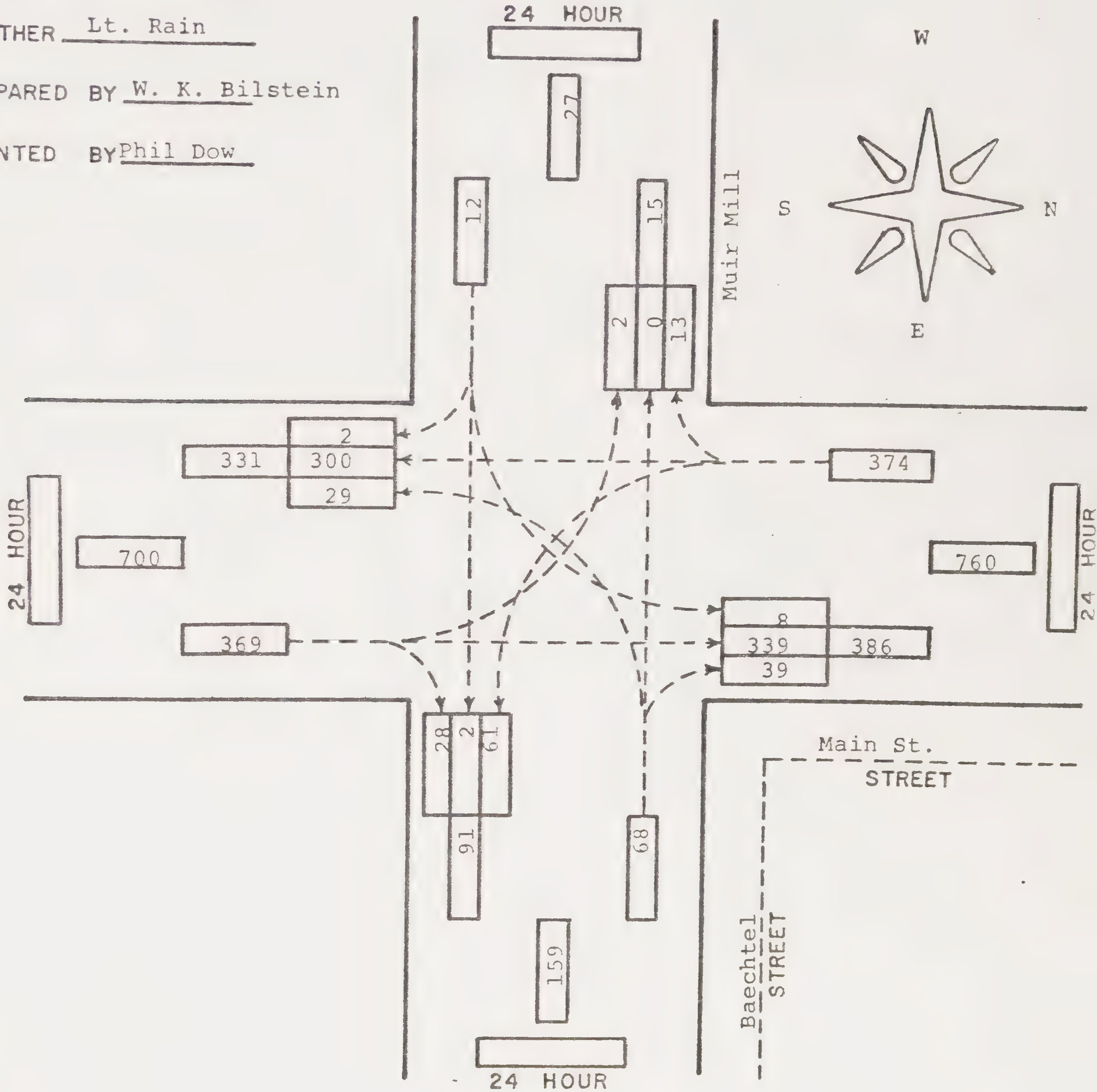
LOCATION Main St. & Baechtel/Muir Mill TIME 4:30 - 5:30 P.M.
(P.M. peak)

DATE 3-29-83

WEATHER Lt. Rain

PREPARED BY W. K. Bilstein

COUNTED BY Phil Dow



# VEHICLE VOLUME SUMMARY

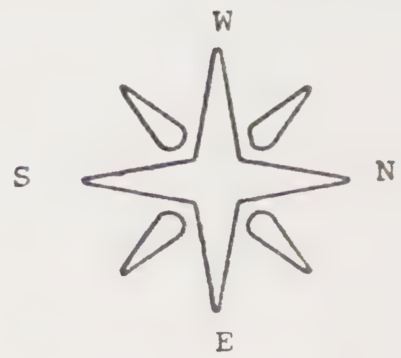
LOCATION Main St. & Baechtel Rd. (N) TIME 12:00 - 1:00 P.M. (P.M. Peak)

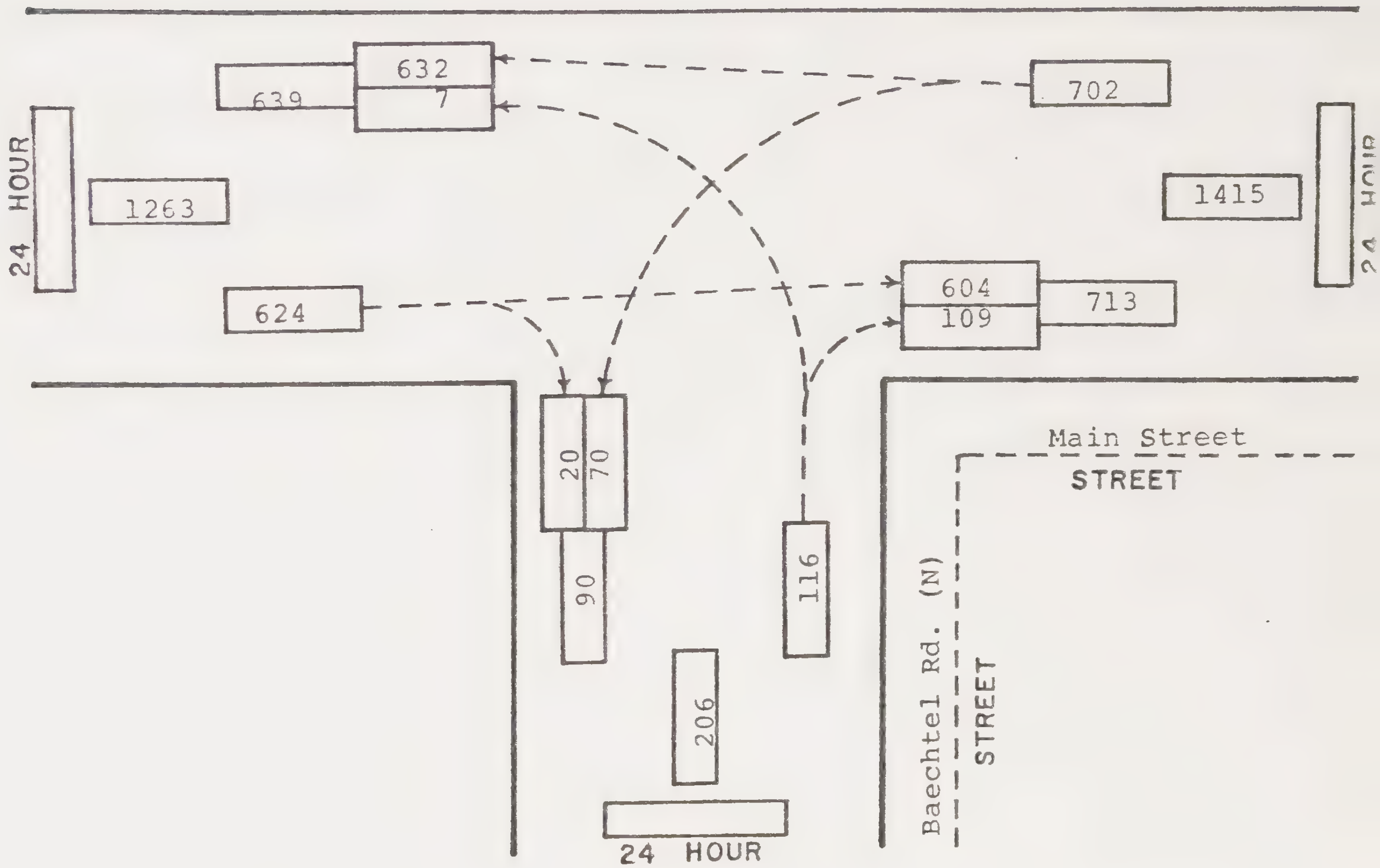
DATE 3-23-83

WEATHER Rain

PREPARED BY W. K. Bilstein

COUNTED BY Phil Dow



# VEHICLE VOLUME SUMMARY

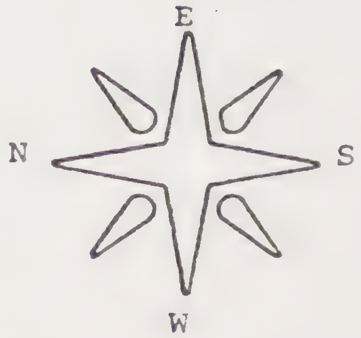
LOCATION Main St. & Holly St. TIME 4:15 - 5:15 P.M. (P.M. Peak)

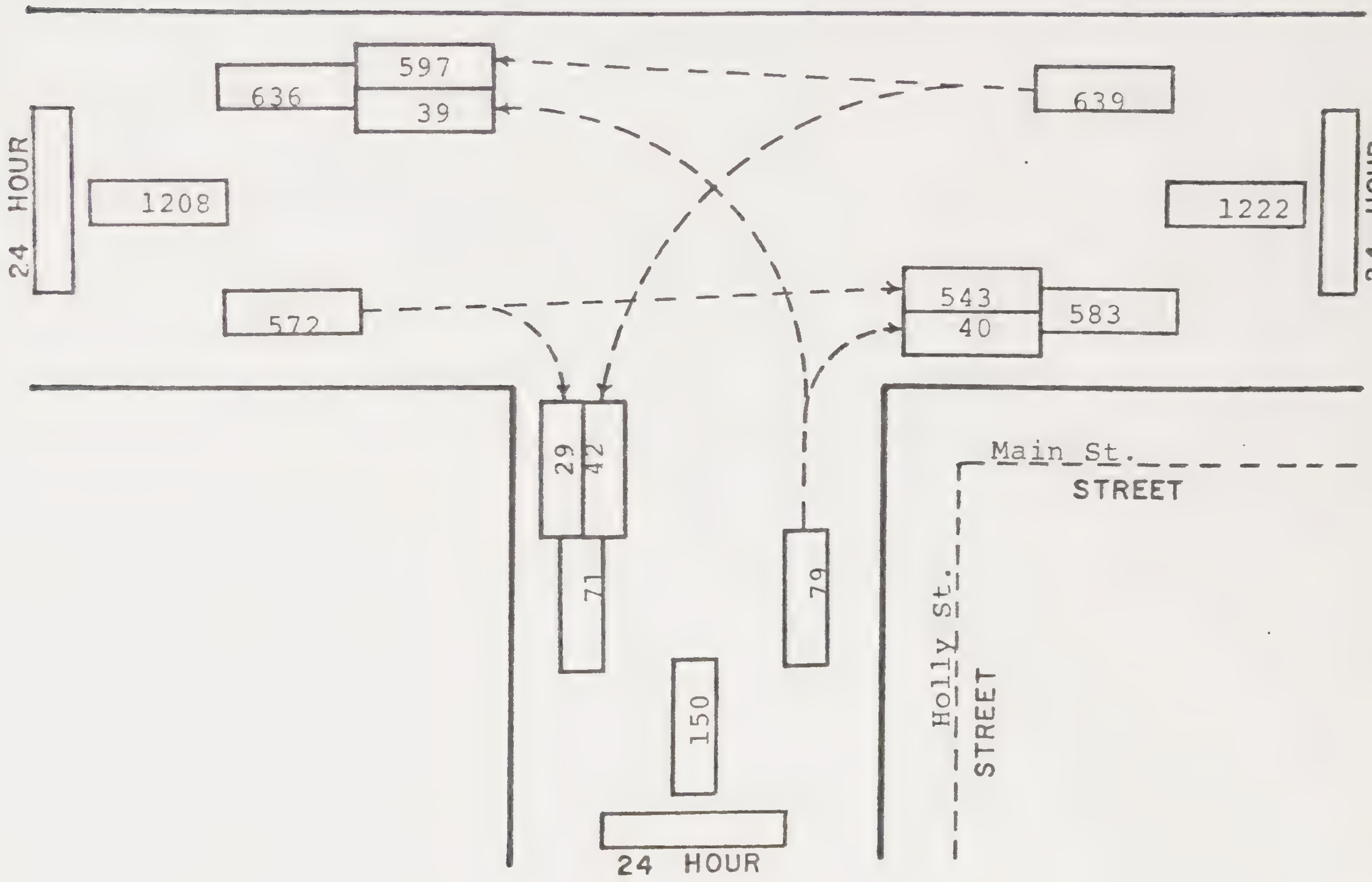
DATE 3-21-83

WEATHER Rain

PREPARED BY W. K.Bilstein

COUNTED BY Phil Dow



# VEHICLE VOLUME SUMMARY

LOCATION Main St. & Walnut St. TIME 12:15 - 1:15 P.M.

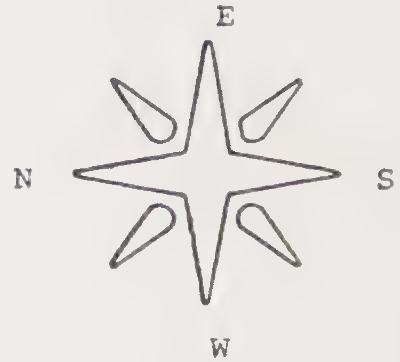
(P.M. Peak)

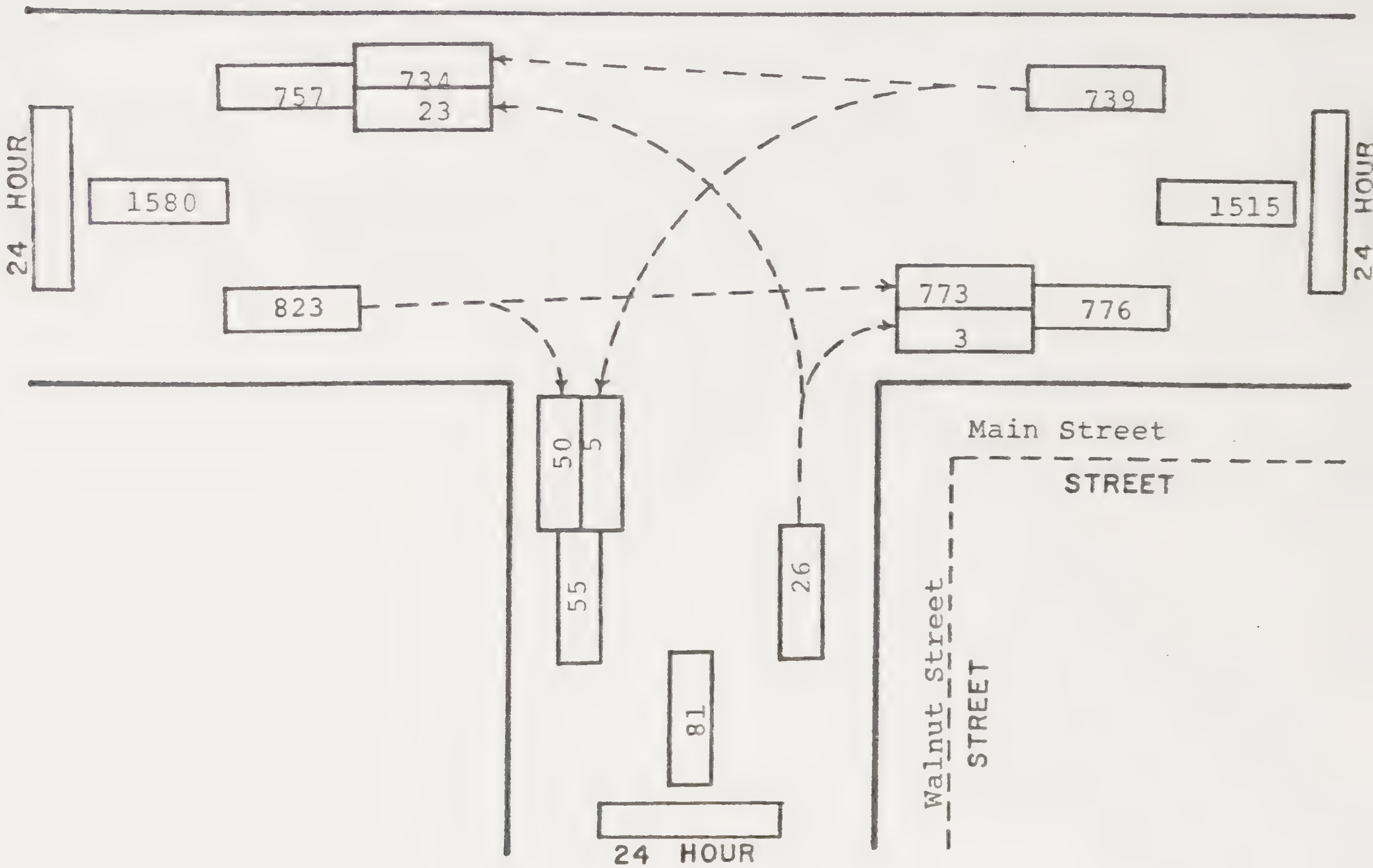
DATE ~~3-18-83~~

WEATHER P - Cloudy

PREPARED BY W. K. Bilstein

COUNTED BY Phil Dow



# VEHICLE VOLUME SUMMARY

LOCATION Main St. & Franklin Ave.

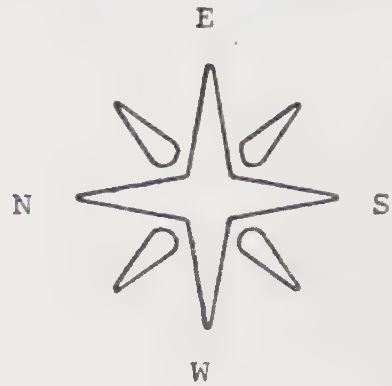
TIME 4:00 - 5:00 P.M. (P.M. Peak)

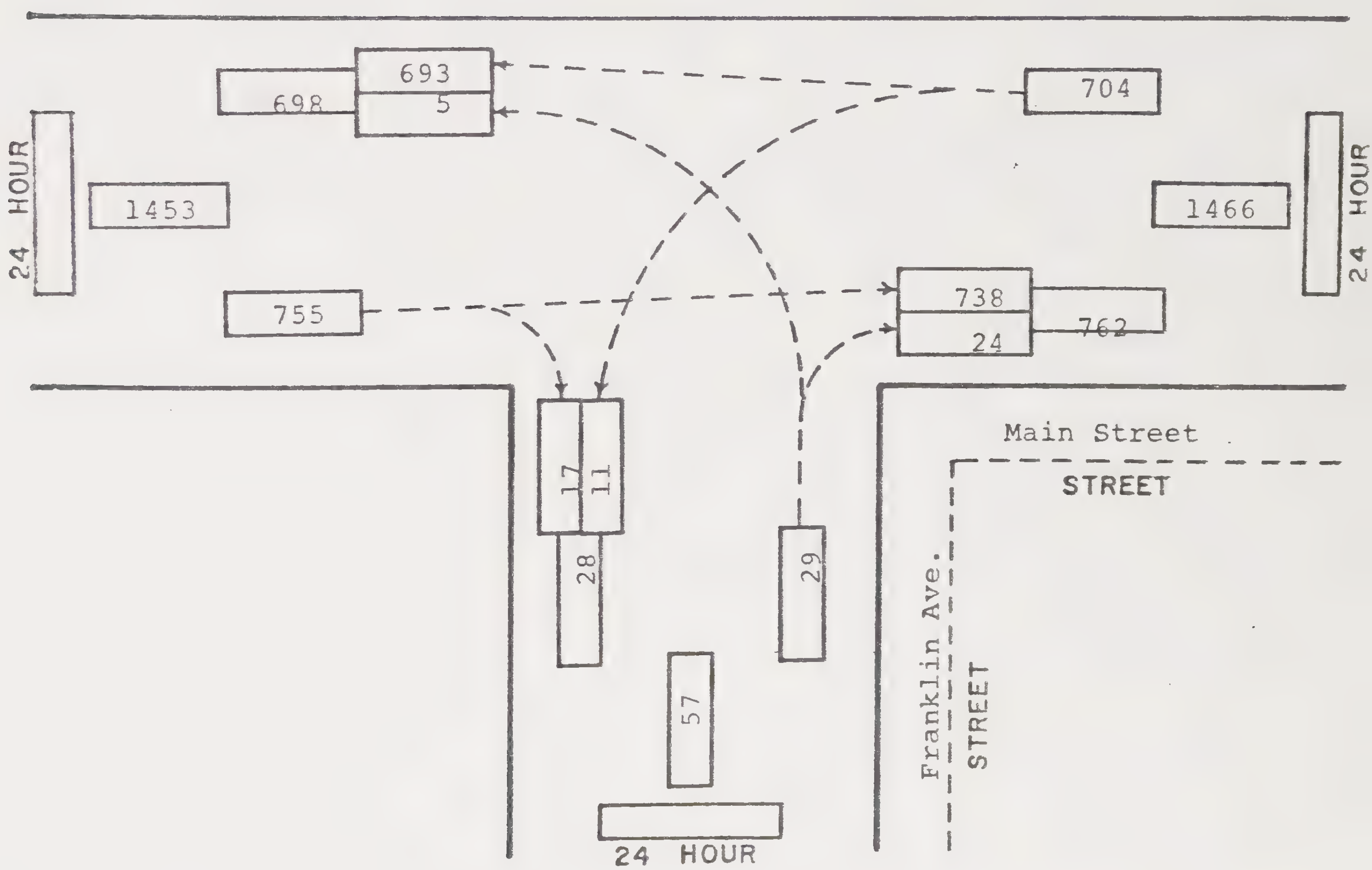
DATE 3-15-83

WEATHER Clear

PREPARED BY W. K. Bilstein

COUNTED BY Phil Dow



# VEHICLE VOLUME SUMMARY

LOCATION Main Street & Flower St. TIME 12:00 - 1:00 P.M.

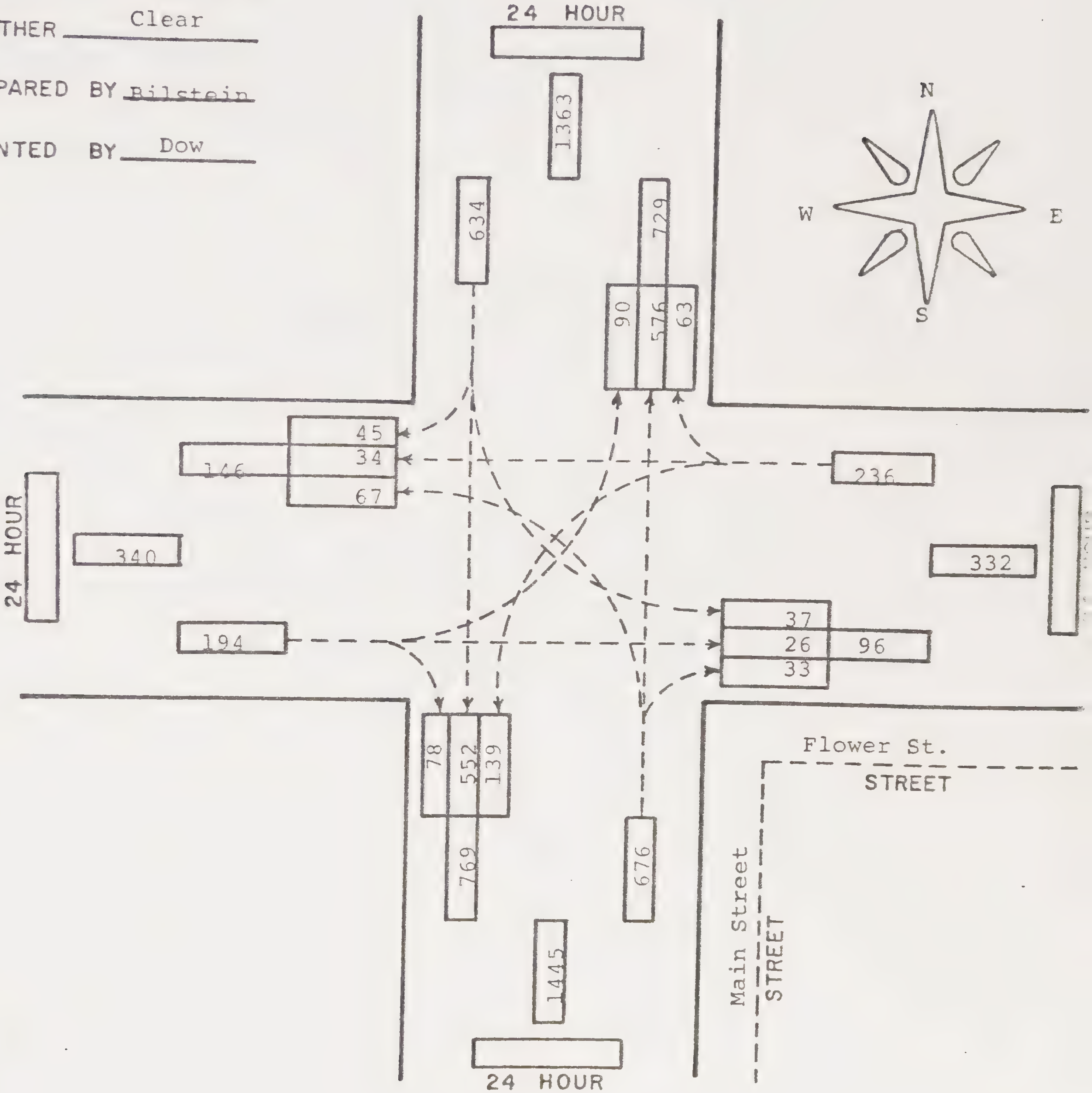
(P.M. Peak)

DATE 4-5-83

WEATHER Clear

PREPARED BY Bilstein

COUNTED BY Dow



# VEHICLE VOLUME SUMMARY

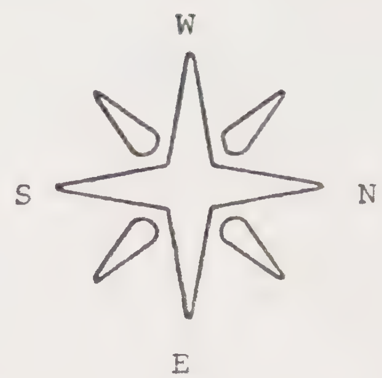
LOCATION Main St. & E. Valley St.　　TIME 12:00 - 1:00 P.M. (P.M. Peak)

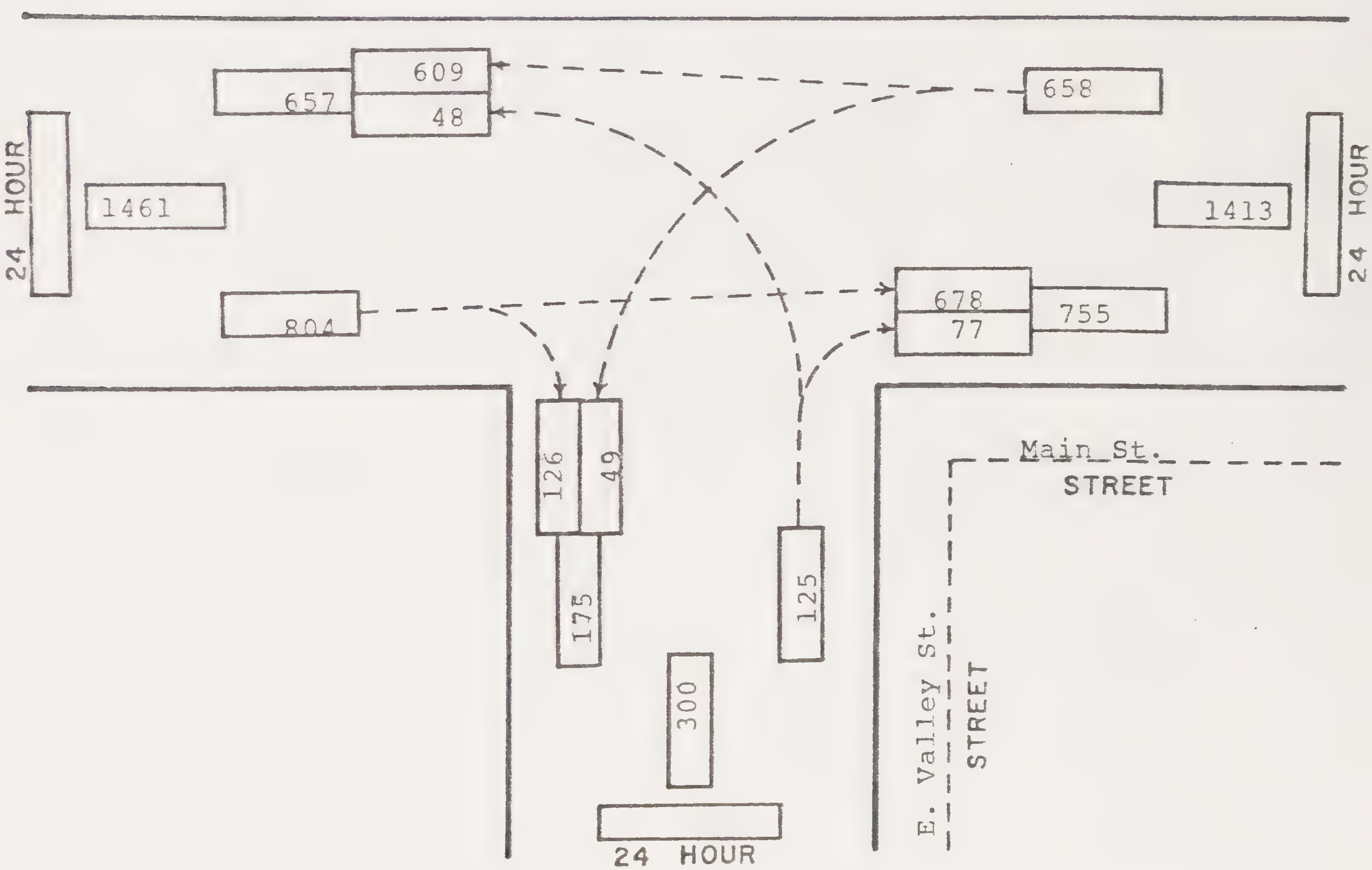
DATE 4-12-83

WEATHER Clear

PREPARED BY ~~W. K. Bilstein~~

COUNTED BY W. K. Bilstein



# VEHICLE VOLUME SUMMARY

LOCATION Main St. & Mendocino Ave. TIME 4:15 - 5:15 P.M.

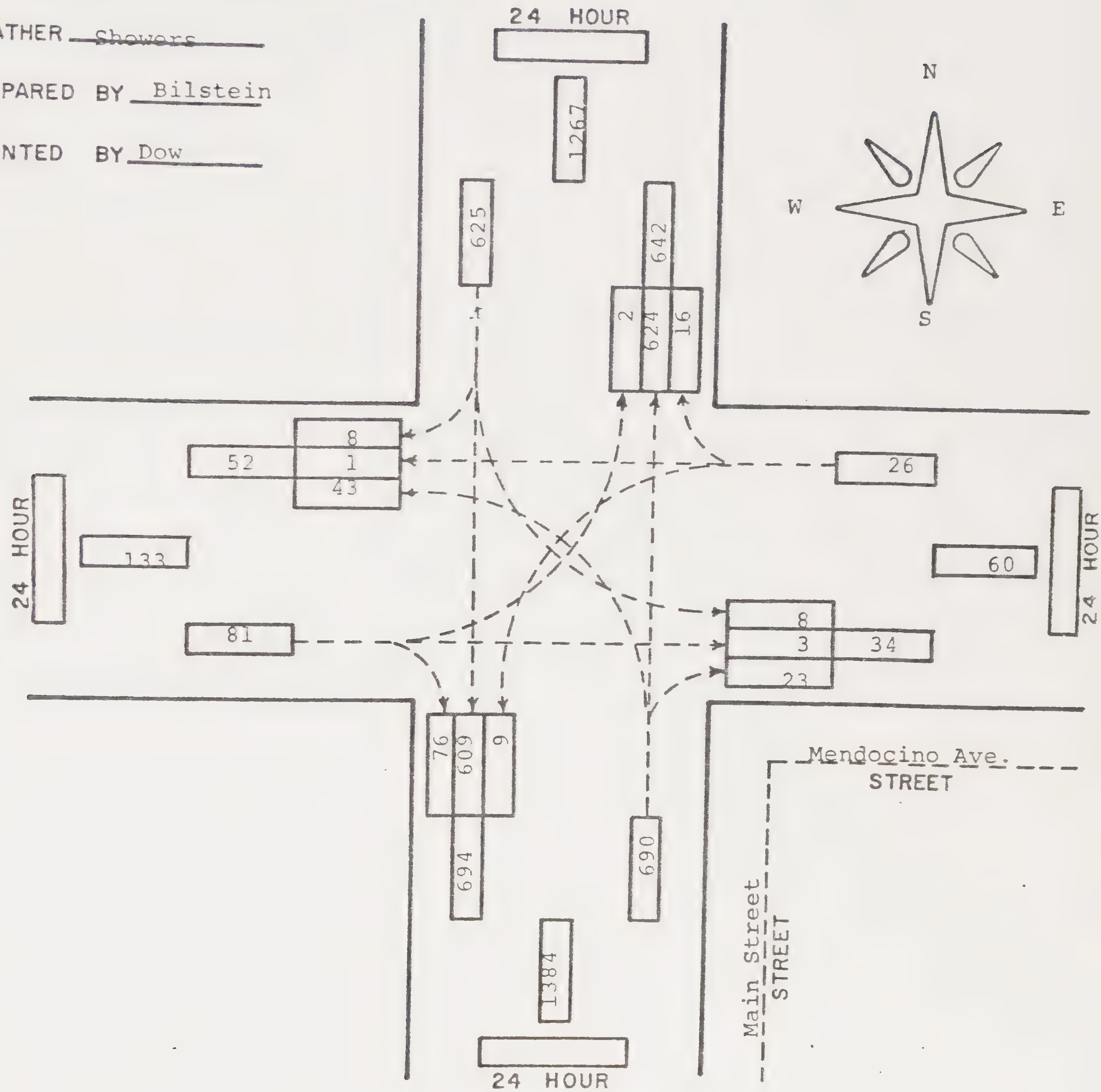
(P.M. Peak)

DATE 3-3-83

WEATHER Showers

PREPARED BY Bilstein

COUNTED BY Dow



# VEHICLE VOLUME SUMMARY

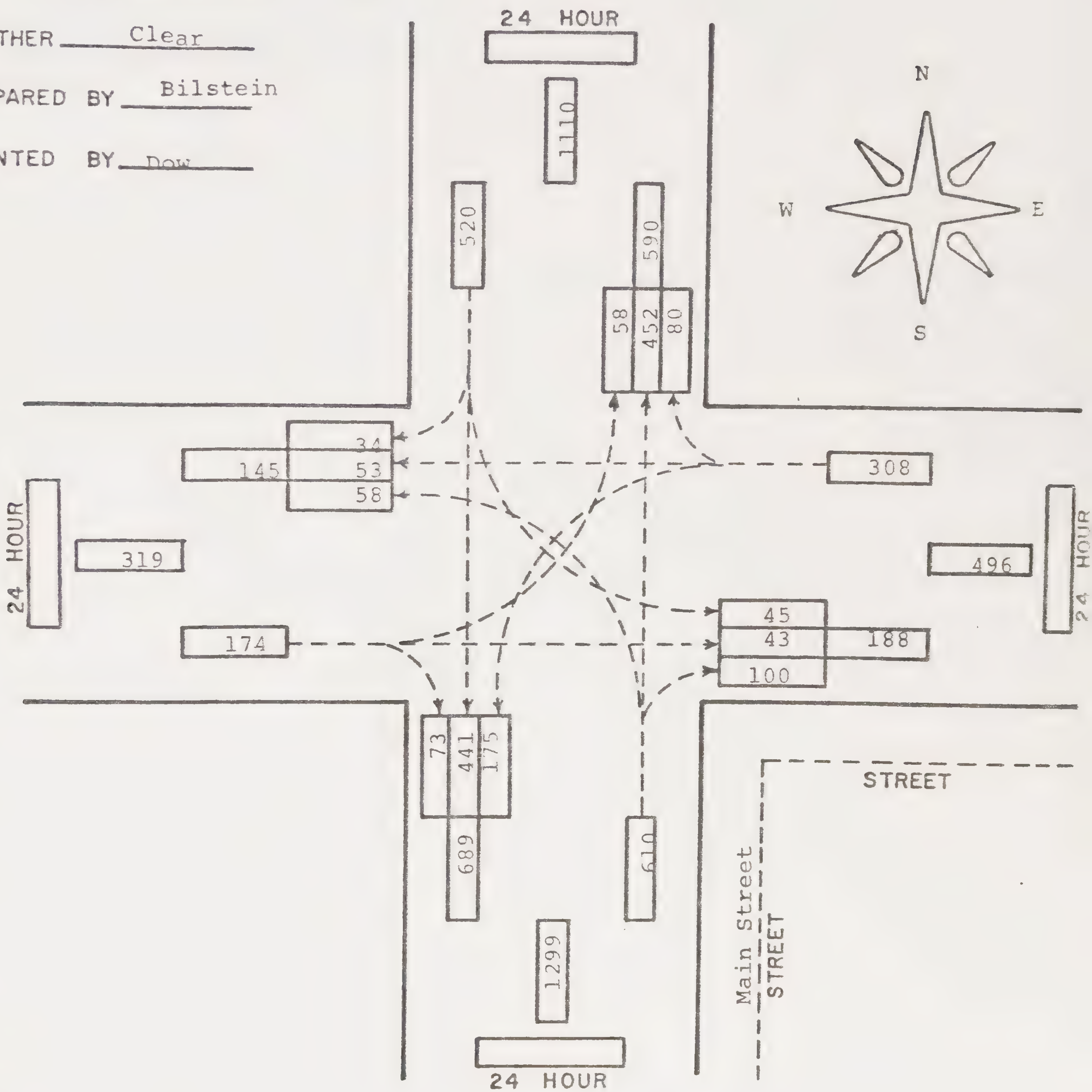
LOCATION Main St. & Commercial St. TIME 4:00 - 5:00 P.M. (P.M. Peak)

DATE 4-14-83

WEATHER Clear

PREPARED BY Bilstein

COUNTED BY Dow



# VEHICLE VOLUME SUMMARY

LOCATION Sherwood Road & Main St.

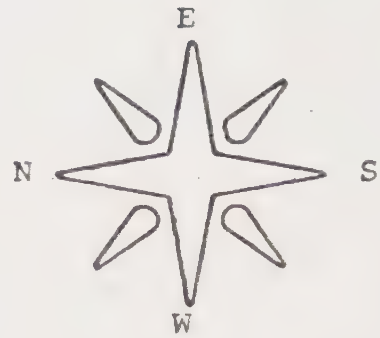
TIME 4:15 - 5:15 P.M. (P.M. Peak)

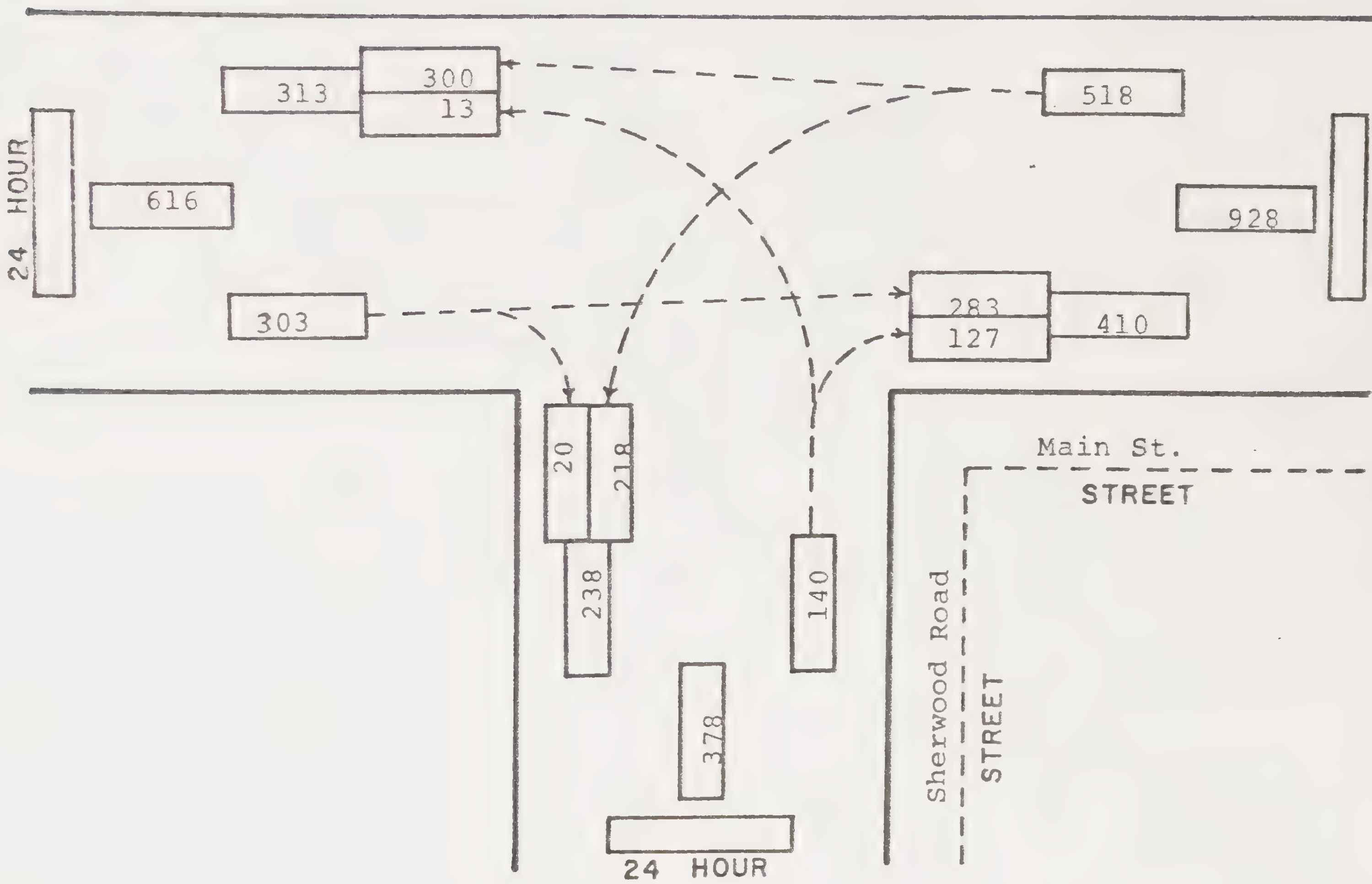
DATE 4-13-83

WEATHER Clear

PREPARED BY W. K. Bilstein

COUNTED BY W. K. Bilstein



# VEHICLE VOLUME SUMMARY

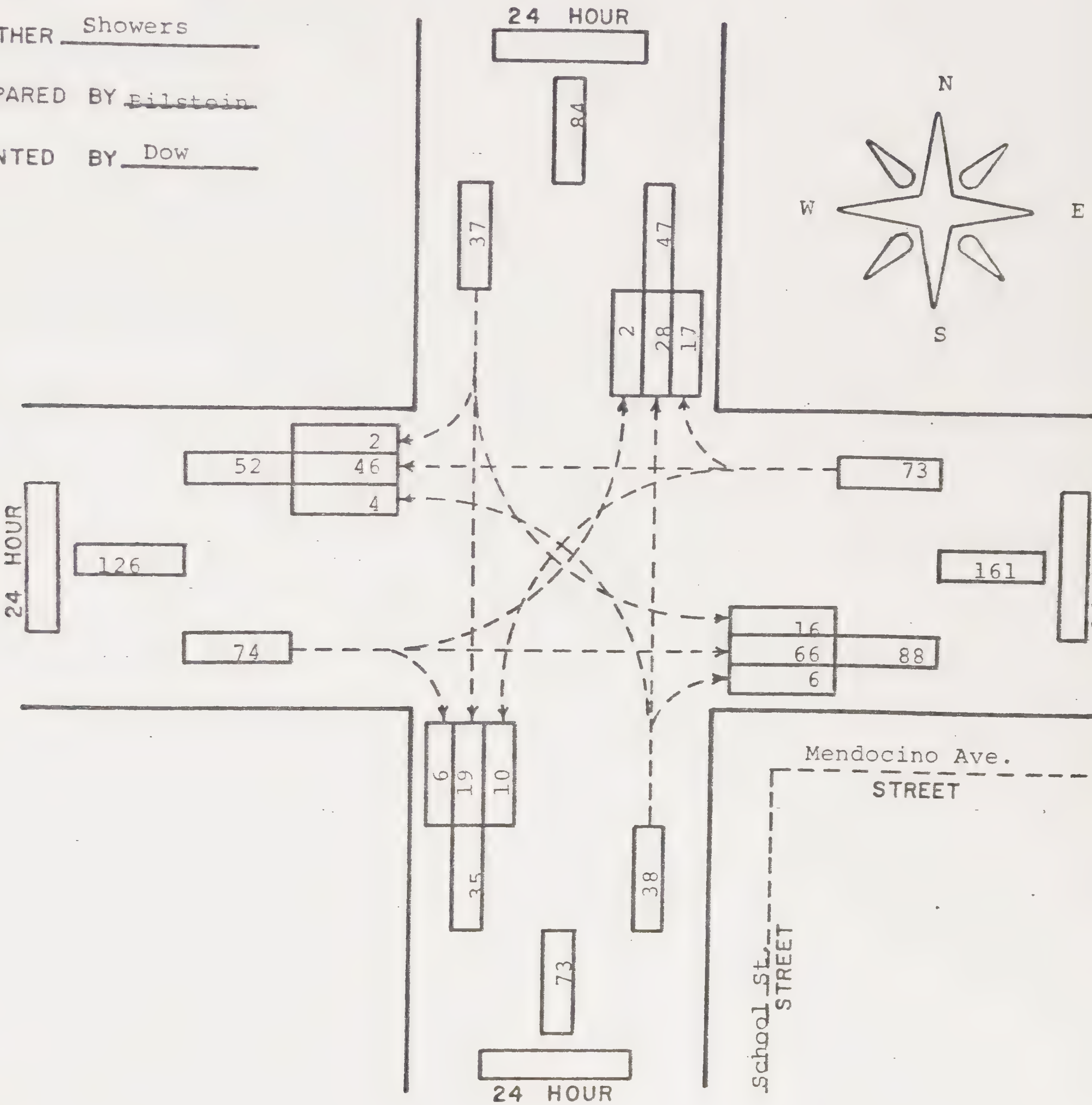
LOCATION School St. & Mendocino Ave. TIME 11:30 A.M. - 12:30 P
(A.M. Peak)

DATE 3-17-83

WEATHER Showers

PREPARED BY ~~Bilstein~~

COUNTED BY Dow



# VEHICLE VOLUME SUMMARY

LOCATION Humboldt & E. Commercial TIME 12:00 - 1:00 P.M.

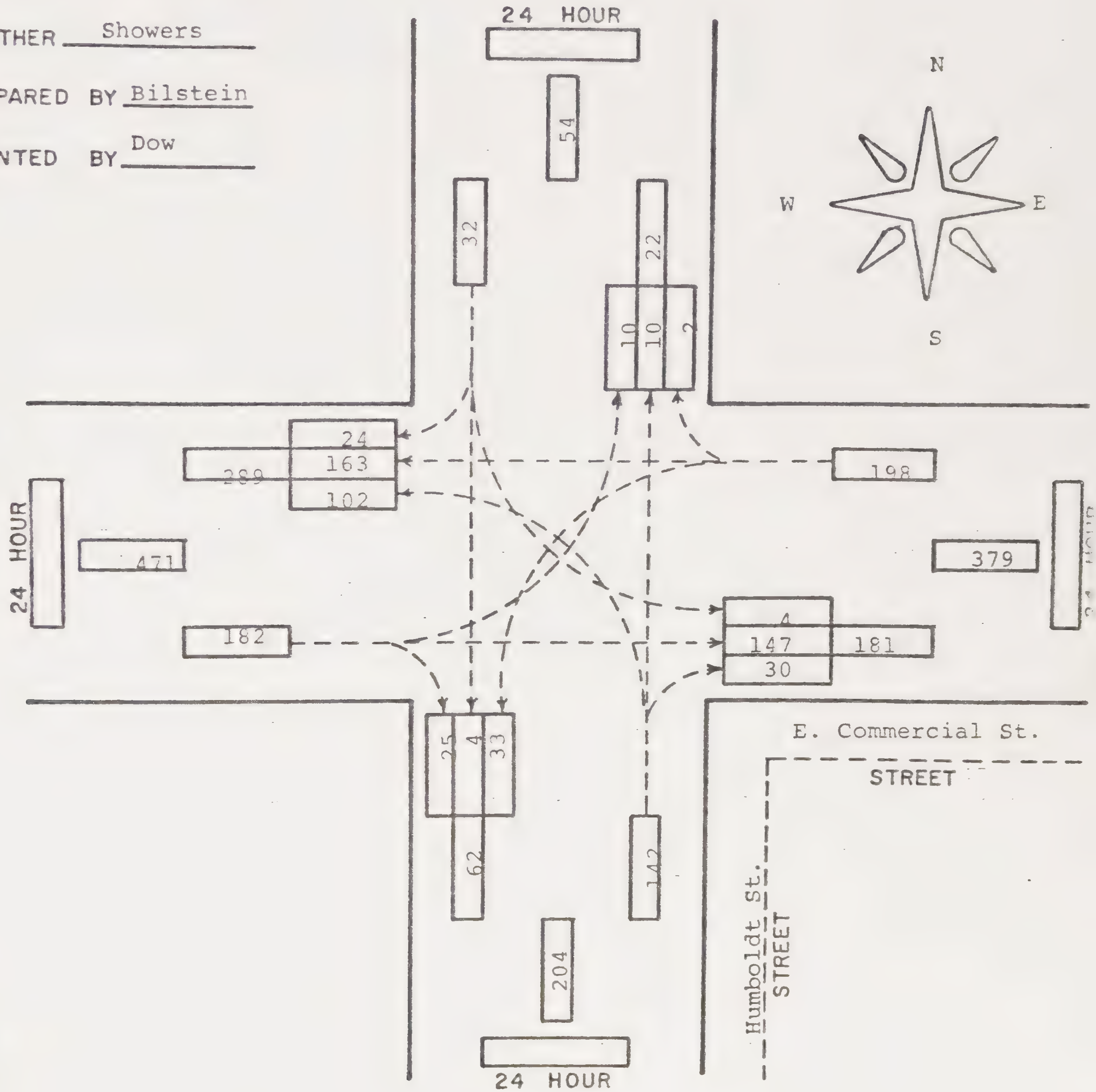
(A.M. Peak)

DATE 3-2-83

WEATHER Showers

PREPARED BY Bilstein

COUNTED BY Dow



# VEHICLE VOLUME SUMMARY

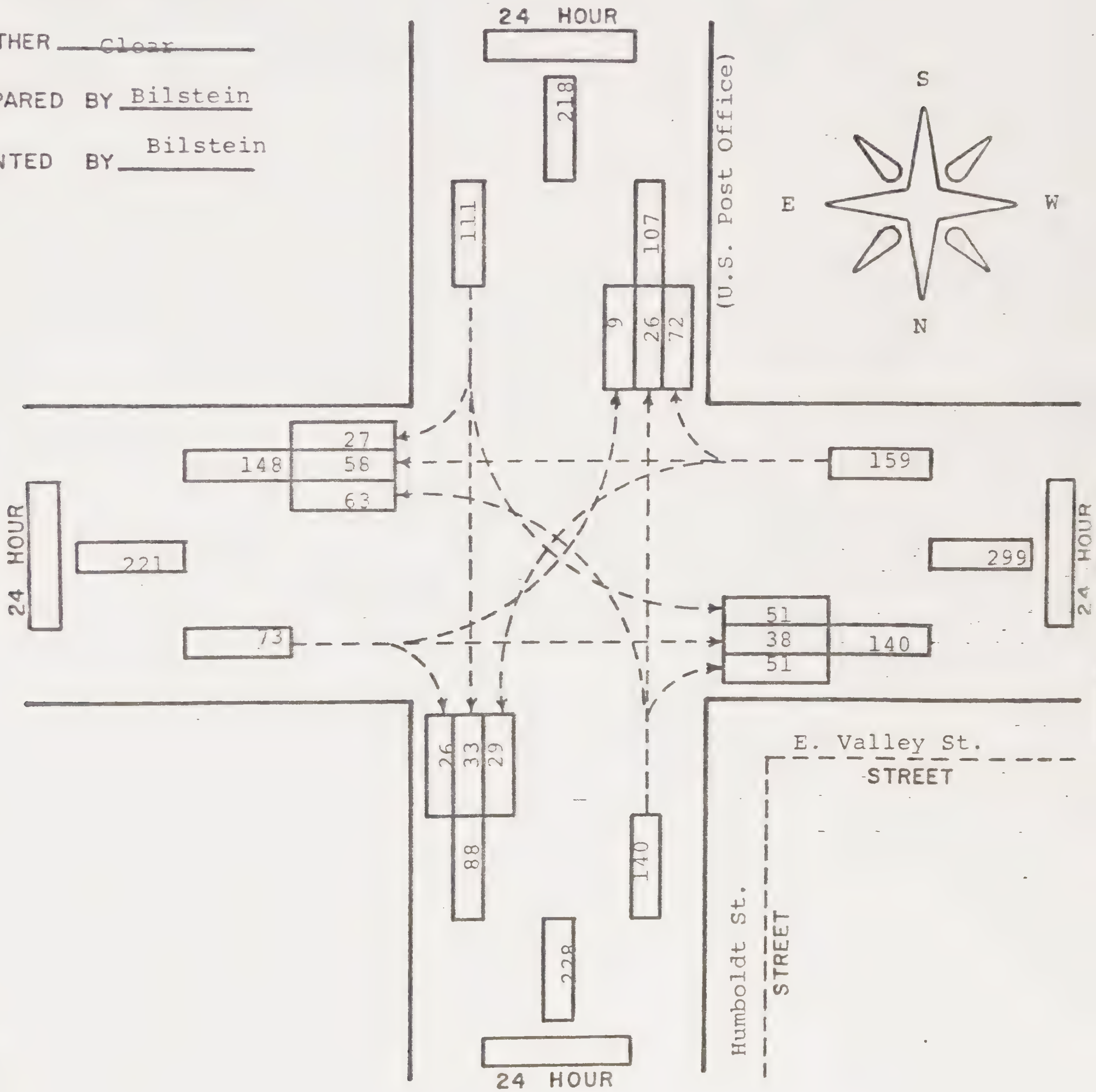
LOCATION Humboldt St. & E.Valley St. TIME 12:00 - 1:00 P.M.
(P.M. Peak)

DATE 4-6-83

WEATHER Clear

PREPARED BY Bilstein

COUNTED BY Bilstein



# VEHICLE VOLUME SUMMARY

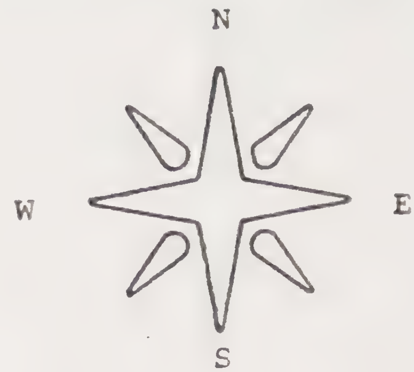
LOCATION School St. & Commercial St. TIME 12:00 - 1:00 P.M.
(P.M. Peak)

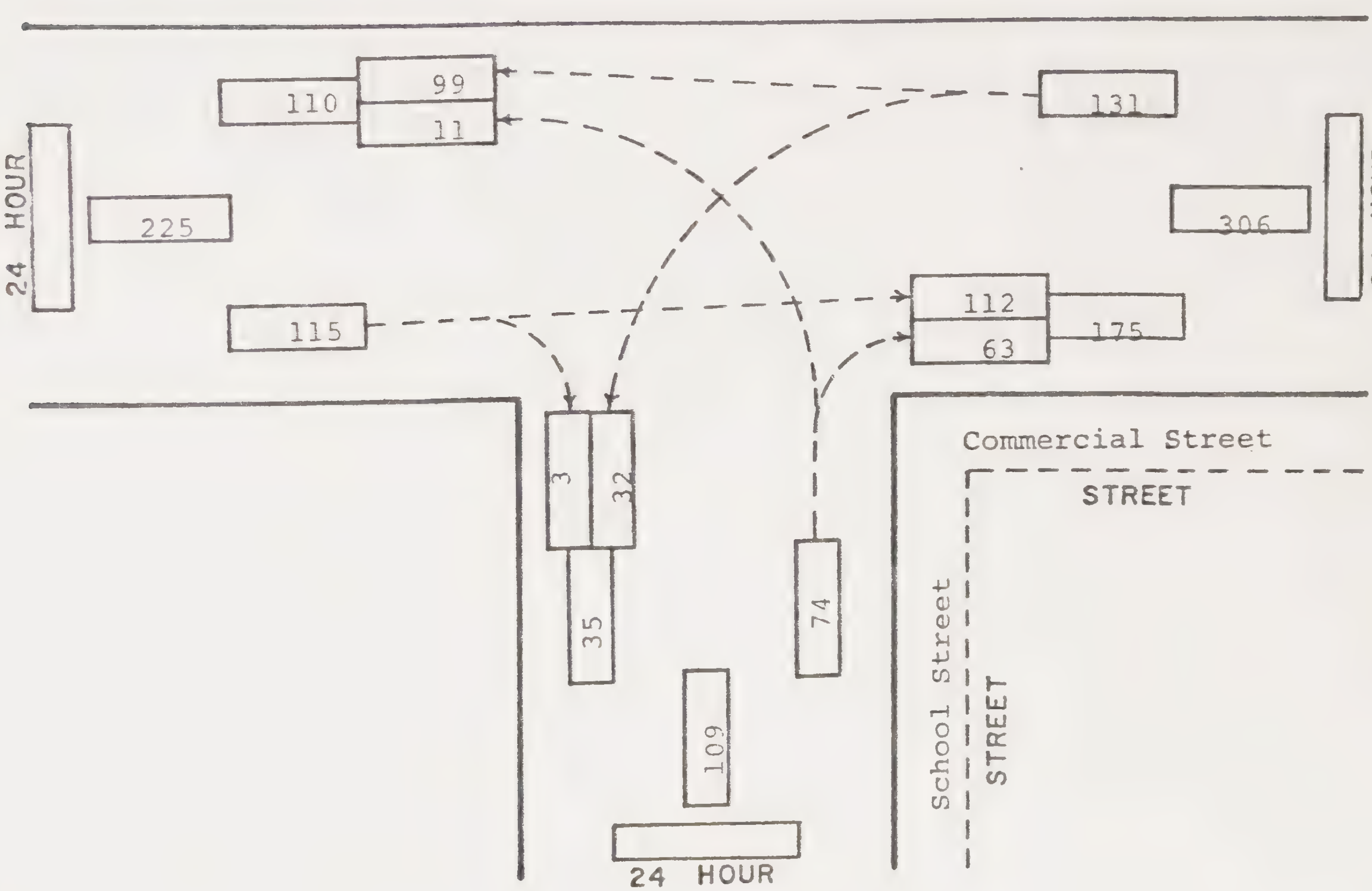
DATE 4-5-83

WEATHER ~~Clear~~

PREPARED BY W. K. Bilstein

COUNTED BY W. K. Bilstein



# VEHICLE VOLUME SUMMARY

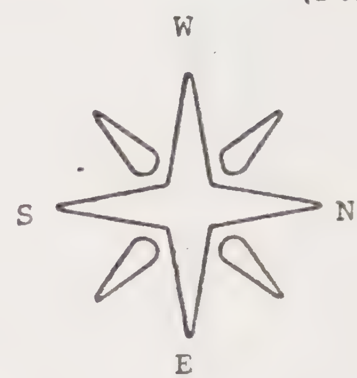
LOCATION Baechtel Road & E. Hill Rd. TIME 4:30 - 5:30 P.M.
(P.M. Peak)

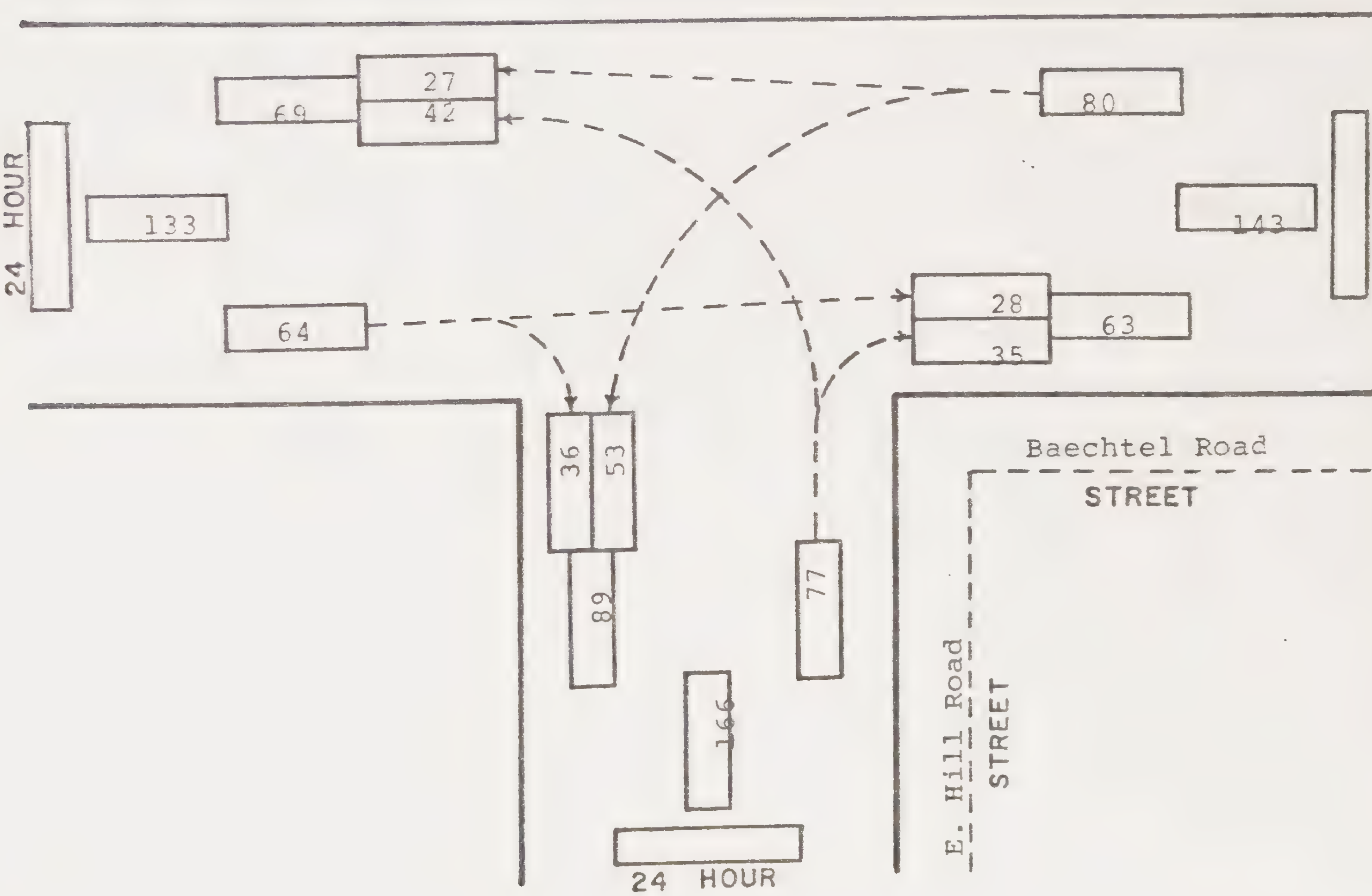
DATE 3-30-83

WEATHER Rain

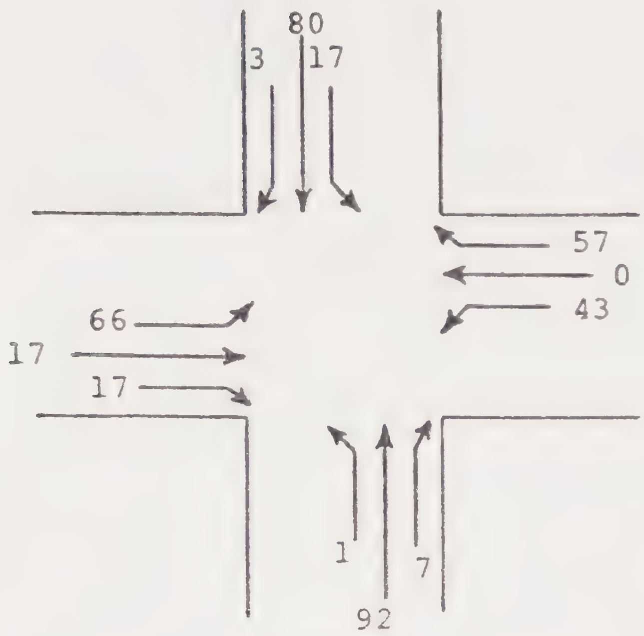
PREPARED BY W. K. Bilstein

COUNTED BY Phil Dow

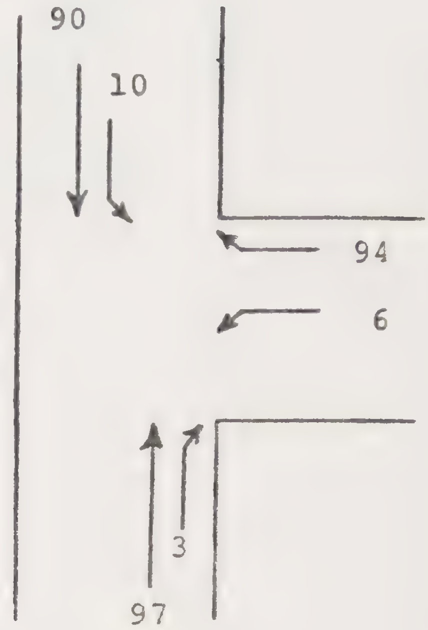


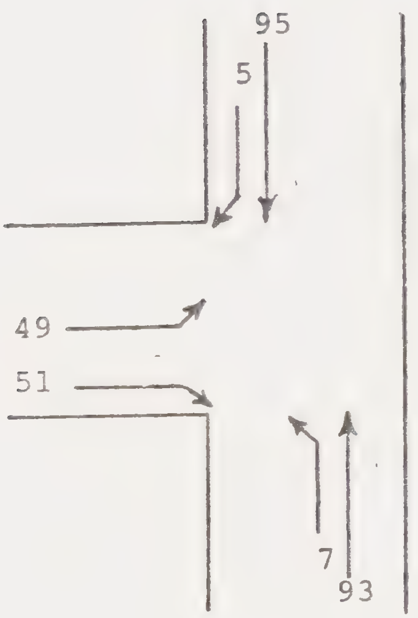
PEAK HOUR TURNING MOVEMENTS
(EXPRESSED AS PERCENTAGES OF TOTAL APPROACH VOLUME)



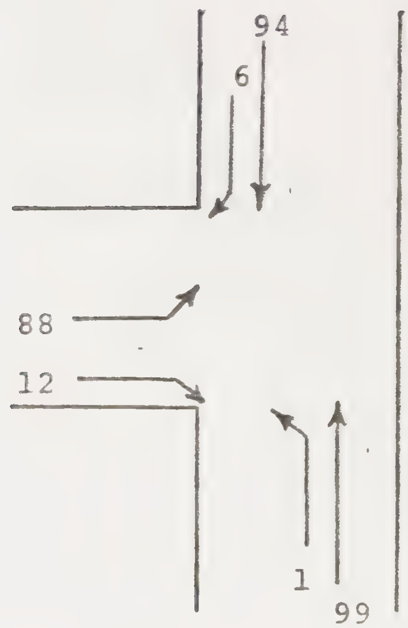

Main & Baechtel/Muir Mill



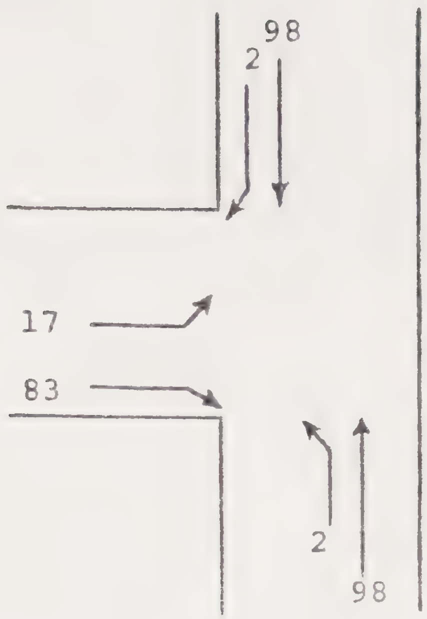

Main and Baechtel



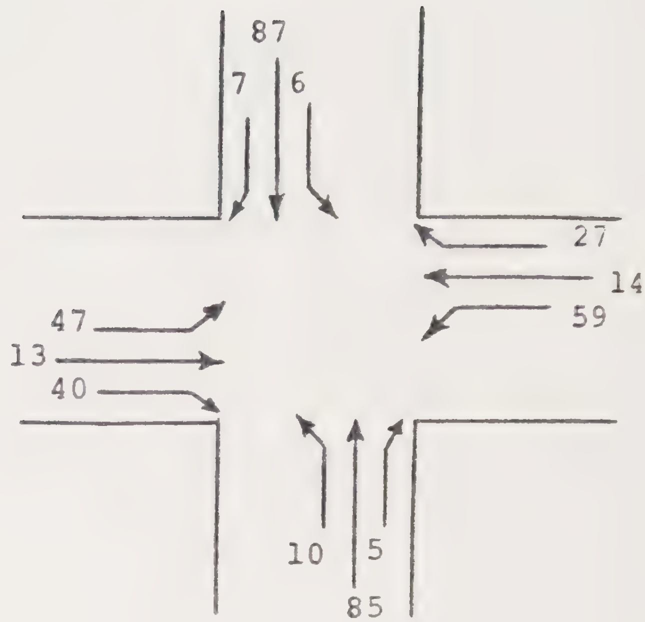

Main & Holly



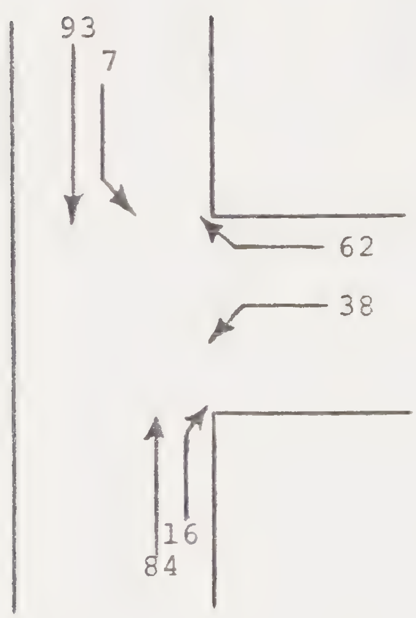

Main & Walnut



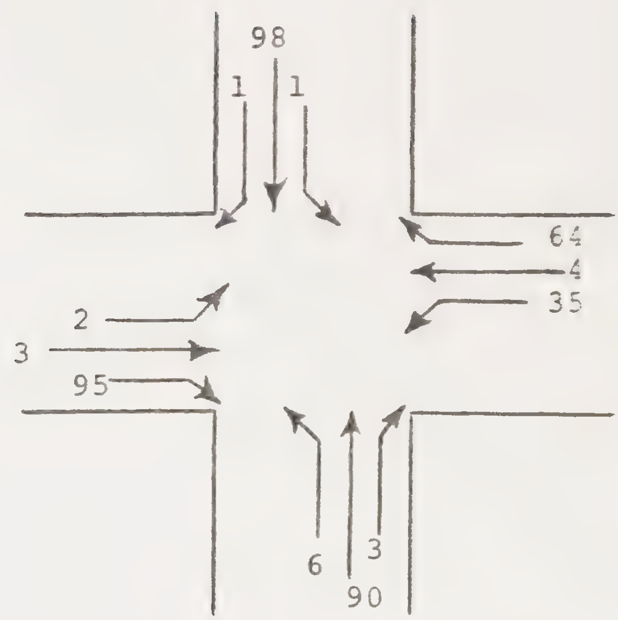

Main & Franklin



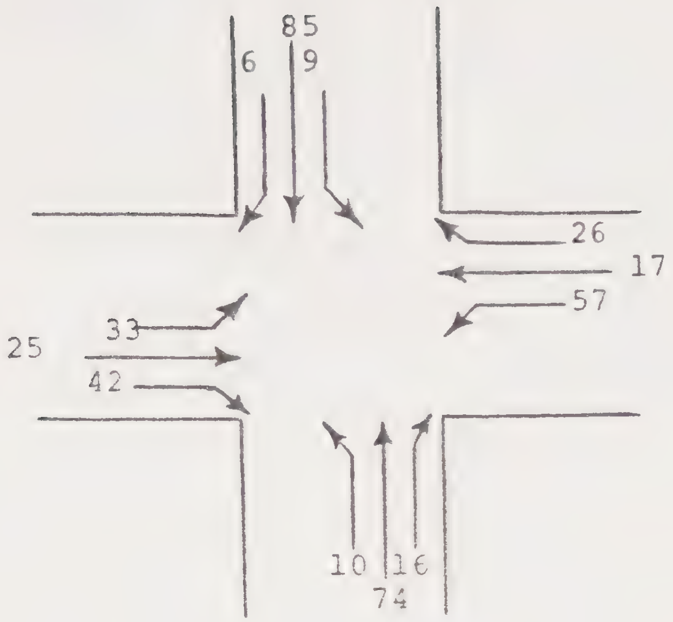

Main & Flower



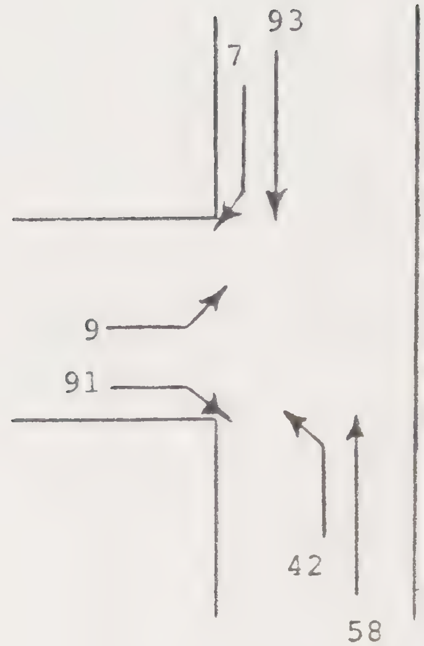

Main & E. Valley



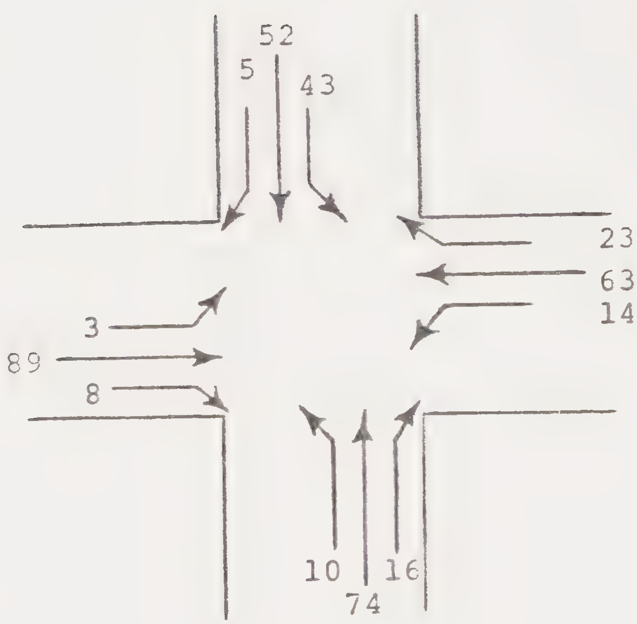

Main & Mendocino



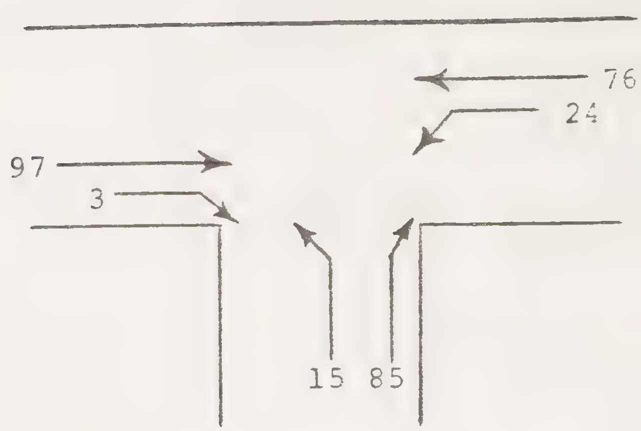

Main & Commercial



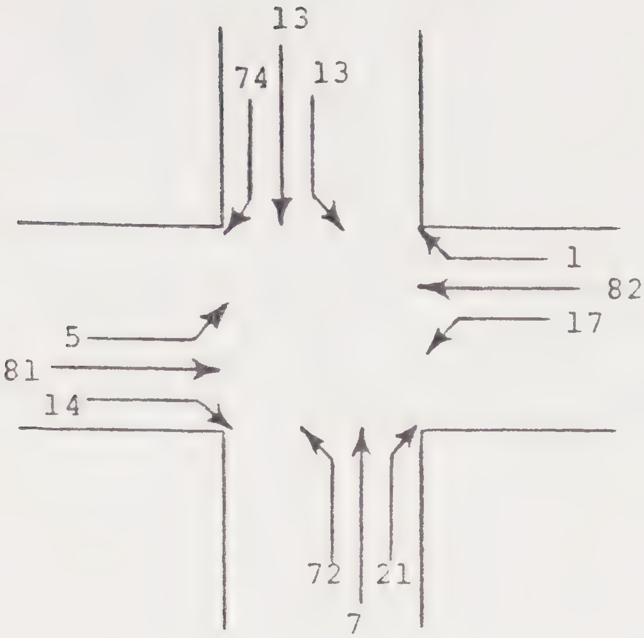

Main & Sherwood



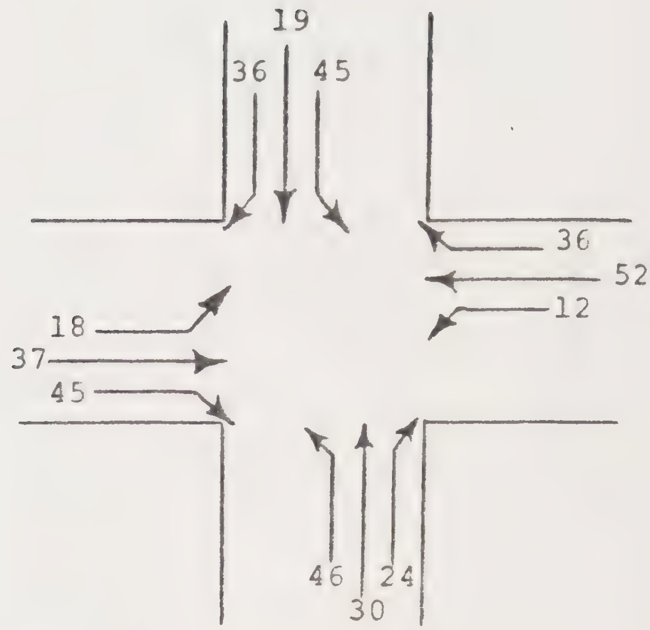

School & Mendocino



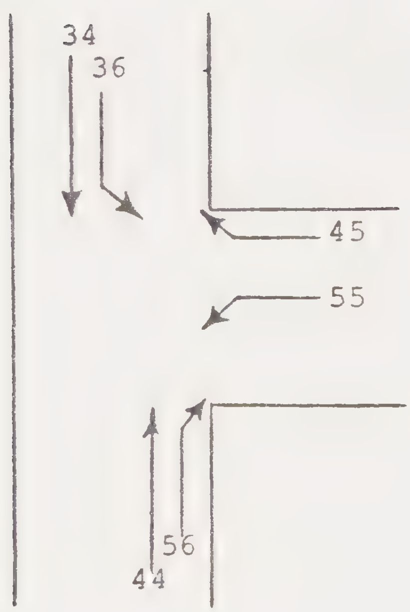

School & Commercial




Humboldt & Commercial




Humboldt & E. Valley




Baechtel & E. Hill

INTERSECTION PEAK VOLUMES AND ESTIMATED CAPACITIES

1983

| INTERSECTION | TYPE OF CONTROL | PEAK HOUR | PEAK HOUR VOLUME | ESTIMATED CAPACITY | VOLUME/ CAPACITY RATIO |
|---|---|---|---|---|---|
| Main & Baechtel/Muir | STOP/EB & WB | 4:30 - 5:30 PM | 823 | 2225 | .37 |
| Main & Baechtel | STOP/WB | 12:00 - 1:00 PM | 1442 | 2225 | .65 |
| Main & Holly | STOP/EB | 4:15 - 5:15 PM | 1290 | 2225 | .58 |
| Main & Walnut | STOP/EB | 12:15 - 1:15 PM | 1588 | 2225 | .71 |
| Main & Franklin | STOP/EB | 4:00 - 5:00 PM | 1488 | 2225 | .67 |
| Main & Flower | SIGNAL | 12:00 - 1:00 PM | 1740 | 2600 | .67 |
| Main & East Valley* | STOP/WB | 12:00 - 1:00 PM | 1587 | 2225 | .71 |
| Main & Mendocino | STOP/EB & WB | 4:15 - 5:15 PM | 1422 | 2450 | .58 |
| Main & Commercial | SIGNAL | 4:00 - 5:00 PM | 1612 | 2600 | .62 |
| Main & Sherwood | SIGNAL | 4:15 - 5:15 PM | 961 | 2600 | .37 |
| Baechtel & East Hill | STOP/WB | 4:30 - 5:30 PM | 221 | 2225 | .10 |
| East Valley & Humboldt | STOP/SB | 12:00 - 1:00 PM | 483 | 2225 | .22 |
| Commercial & Humboldt | STOP/NB & SB | 12:00 - 1:00 PM | 554 | 2450 | .23 |
| Commercial & School | STOP/NB | 12:00 - 1:00 PM | 320 | 2225 | .14 |
| Mendocino & School | STOP/4-Way | 11:30 -12:30 PM | 221 | 1600 | .14 |

*treated as T intersection

PREVAILING SPEEDS (SELECTED STREETS)

| (1) STREET | (2) BETWEEN | (3) DIR. | (4) CRITICAL SPEED (85th P) | (5) MEAN SPEED ($\bar{X}$) | PACE (6) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (a) RANGE | PERCENTAGES | | |
| | | | | | | (b) IN | (c) OVER | (d) UNDER |
| BAECHTEL ROAD | East Hill & Main (North) | Both | 41.4 | 36.8 | 32-42 | 72 | 13 | 15 |
| BLOSSER LANE | City Limits & Franklin Ave. | Both | 37.8 | 32.5 | 27-37 | 66 | 19 | 15 |
| COAST STREET | Raymond & Mill | Both | 30.5 | 26.0 | 22-32 | 65 | 10 | 25 |
| EAST HILL ROAD | Baechtel & City Limits | Both | 44.3 | 37.7 | 30-40 | 59 | 32 | 9 |
| EAST COMMERCIAL ST. | Lenore & City Limits | Both | 35.2 | 31.6 | 26-36 | 83 | 11 | 16 |
| EAST VALLEY ROAD | Humboldt & Madden | Both | 28.4 | 25.3 | 21-31 | 87 | 3 | 10 |
| HOLLY STREET | Magnolia & Poplar | Both | 32.3 | 29.2 | 24-34 | 82 | 8 | 10 |
| LOCUST STREET | Hazel & Madrone | Both | 30.3 | 27.0 | 23-33 | 83 | 3 | 14 |
| MENDOCINO AVENUE | Maple & Spruce | Both | 30.4 | 27.5 | 22-32 | 84 | 8 | 8 |
| RAILROAD AVENUE | East Valley & San Francisco | Both | 28.8 | 25.0 | 21-31 | 76 | 6 | 18 |
| SHERWOOD ROAD | City Limits & Main Street | Both | 37.9 | 33.8 | 30-40 | 70 | 7 | 23 |
| WALNUT STREET | Magnolia & Poplar | Both | 35.4 | 30.8 | 27-37 | 61 | 10 | 29 |
| WEST COMMERCIAL ST | Mill Creek & School | Both | 31.2 | 26.4 | 22-32 | 82 | 12 | 6 |

MAJOR INTERSECTION ACCIDENT HISTORY
ALL TYPES 1980-82

| INTERSECTION | 1980 | 1981 | 1982 | TOTAL |
|---|---|---|---|---|
| Main/Baechtel/Muir | 0 | 0 | 1 | 1 |
| Main/Baechtel | 5 | 1 | 0 | 6 |
| Main/Commercial | 8 | 5 | 8 | 21 |
| Main/East Valley | 3 | 3 | 3 | 9 |
| Main/Flower | 3 | 3 | 6 | 12 |
| Main/Franklin | 1 | 1 | 0 | 2 |
| Main/Holley | 2 | 2 | 2 | 6 |
| Main/Mendocino | 1 | 0 | 1 | 2 |
| Main/Sherwood | 8 | 2 | 5 | 15 |
| Main/Walnut | 1 | 0 | 1 | 2 |
| Baechtel/E. Hill | 0 | 0 | 0 | 0 |
| Commercial/Humboldt | 1 | 0 | 0 | 1 |
| Commercial/School | 1 | 0 | 0 | 1 |
| Humboldt/East Valley | 0 | 1 | 0 | 1 |
| Mendocino/School | 0 | 0 | 1 | 1 |

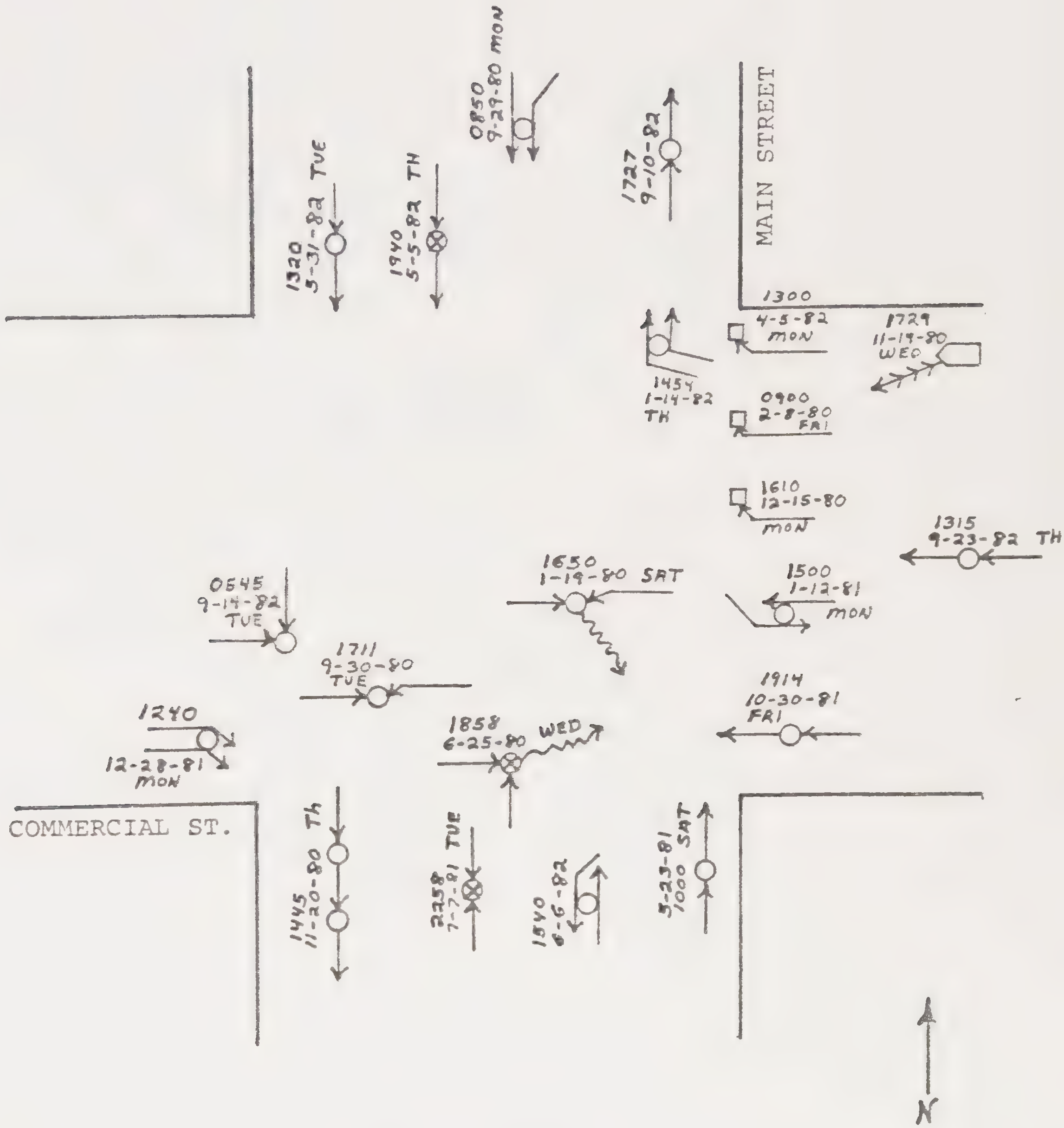
SELECTED INTERSECTION ACCIDENT HISTORY

BY YEAR AND TYPE

1980-82

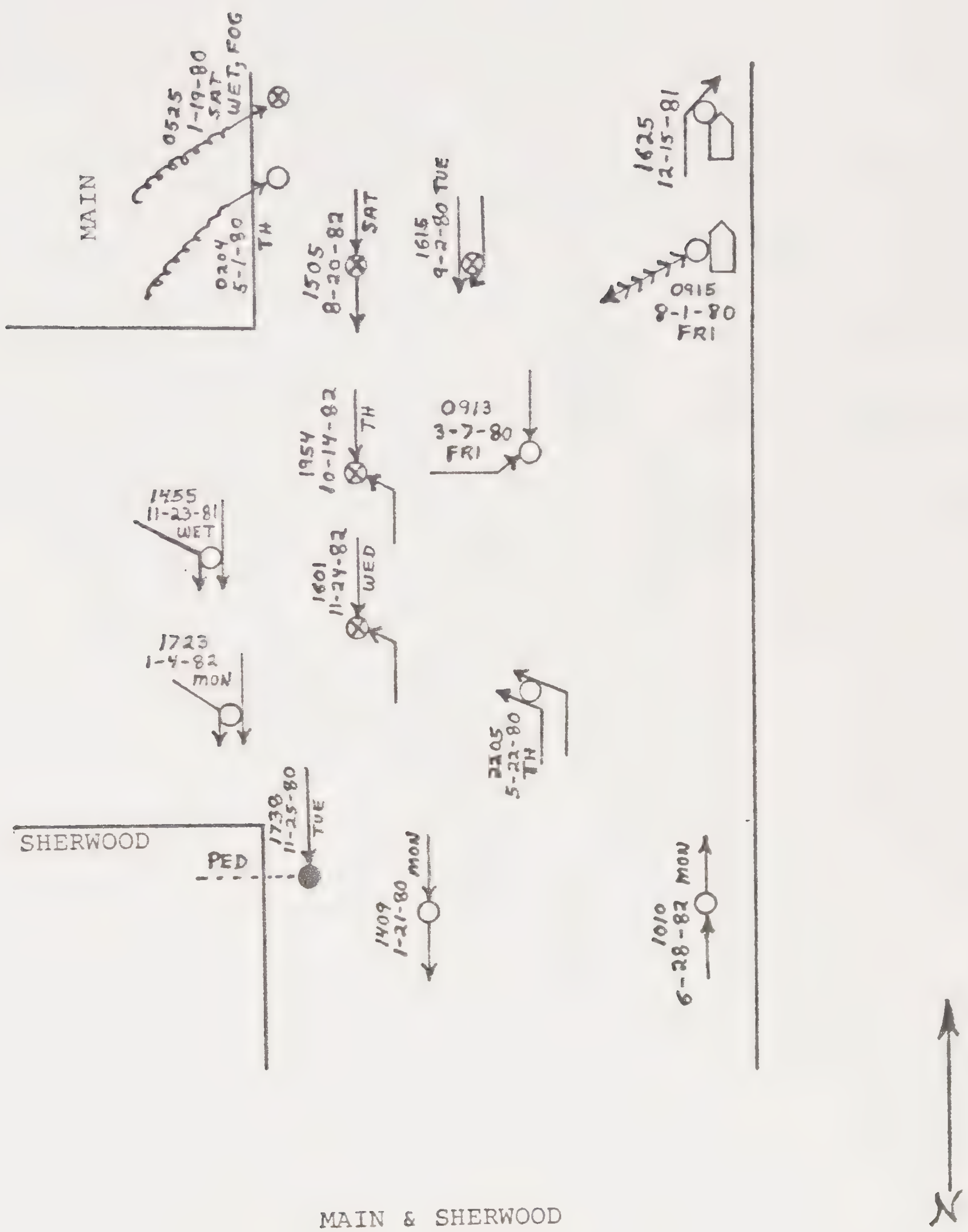
| INTERSECTION | | 1980 | 1981 | 1982 | TOTAL |
|---|---|---|---|---|---|
| Main/Commercial | | | | | |
| | P.D. | 7 | 4 | 7 | 18 |
| | Inj. | 1 | 1 | 1 | 3 |
| | Fat. | 0 | 0 | 0 | 0 |
| | Tot. | 8 | 5 | 8 | 21 |
| Main/Sherwood | | | | | |
| | P.D. | 5 | 2 | 2 | 9 |
| | Inj. | 2 | 0 | 3 | 5 |
| | Fat. | 1 | 0 | 0 | 1 |
| | Tot. | 8 | 2 | 5 | 15 |
| Main/Flower | | | | | |
| | P.D. | 3 | 2 | 5 | 10 |
| | Inj. | 0 | 1 | 1 | 2 |
| | Fat. | 0 | 0 | 0 | 0 |
| | Tot. | 3 | 3 | 6 | 12 |
| Main/East Valley | | | | | |
| | P.D. | 1 | 2 | 0 | 3 |
| | Inj. | 2 | 1 | 3 | 6 |
| | Fat. | 0 | 0 | 0 | 0 |
| | Tot. | 3 | 3 | 3 | 9 |

# 3 YEAR COLLISION DIAGRAM
## MAIN & COMMERCIAL
## (1980-82)




MAIN & COMMERCIAL

3 YEAR COLLISION DIAGRAM
MAIN & SHERWOOD
(1980-82)

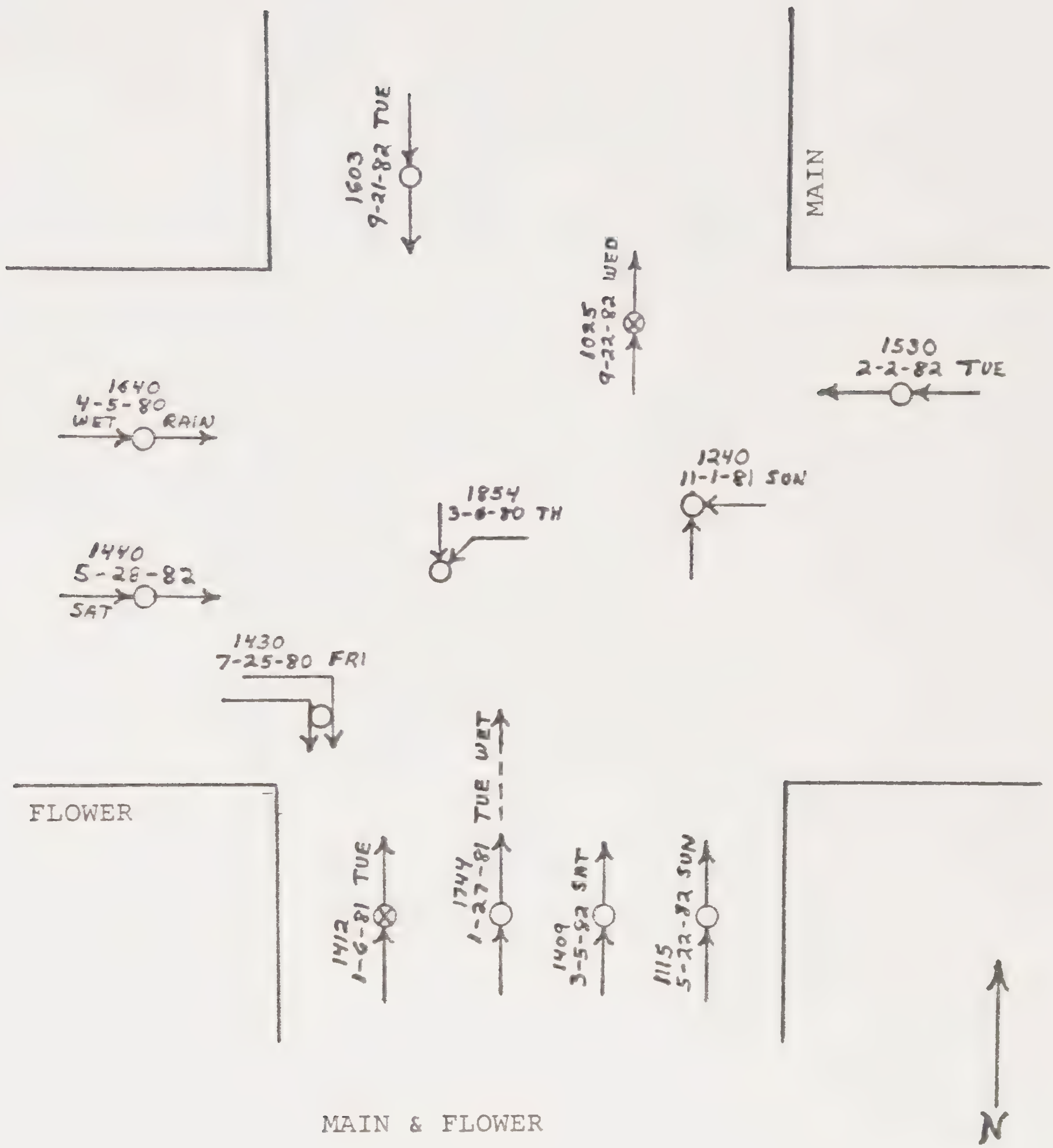



MAIN & SHERWOOD



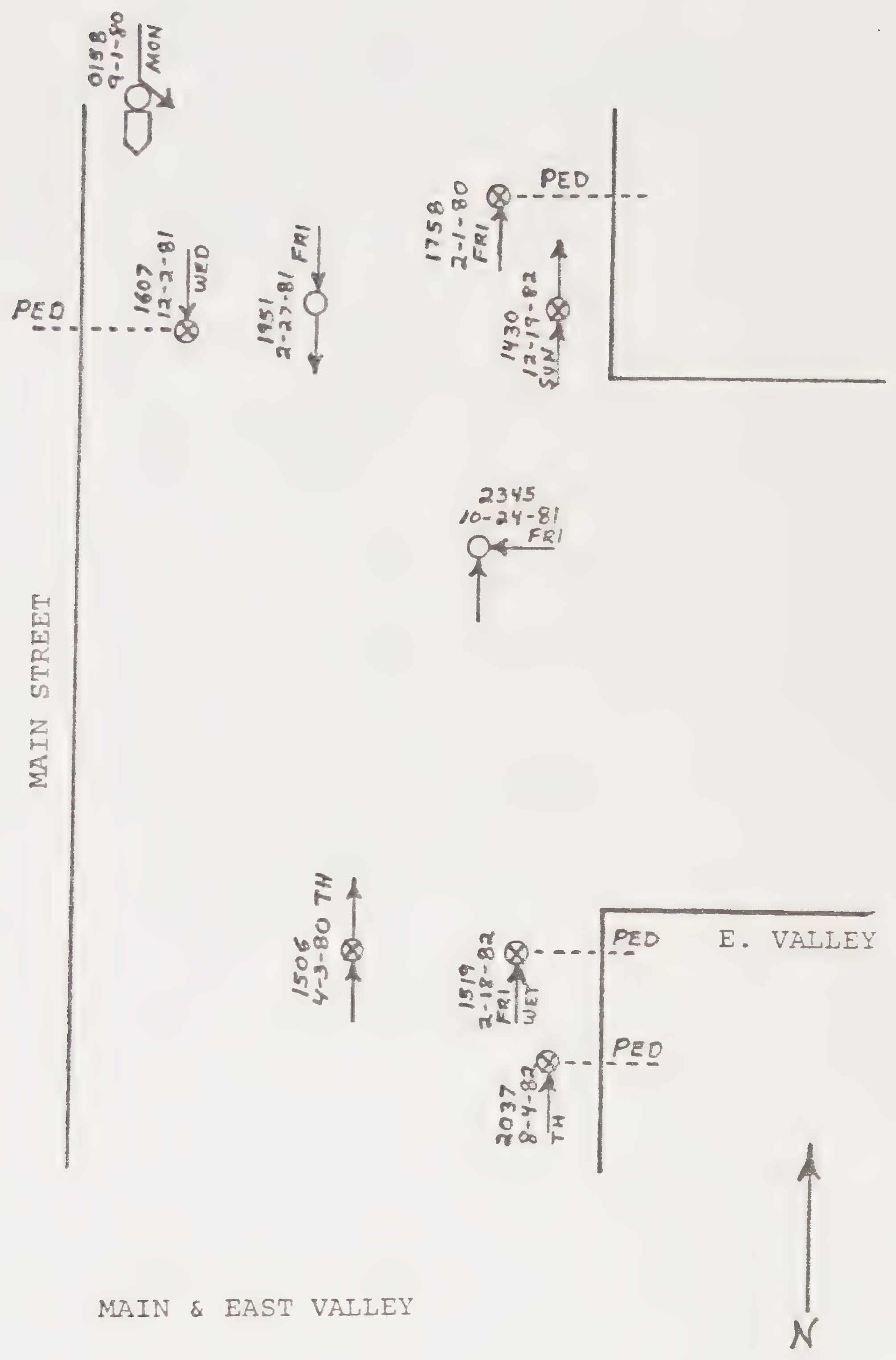
NOTE: Intersection signalized August 1982

3-YEAR COLLISON DIAGRAM
MAIN & FLOWER
(1980-82)




MAIN & FLOWER

3-YEAR COLLISON DIAGRAM
MAIN & EAST VALLEY
(1980-82)




MAIN & EAST VALLEY

COLLISION DIAGRAM

LEGEND

RIGHT ANGLE

LEFT TURN

REAR-END

HEAD-ON

SIDE SWIPE, REAR-END

SIDE SWIPE, HEAD-ON

Bike
Ped PEDESTRIAN, BICYCLE

BACKING

PROPERTY DAMAGE

FIXED OBJECT

INJURY

FATAL

PARKED CAR

OUT OF CONTROL

ROLLOVER


CALIFORNIA
SCENIC HIGHWAY SYSTEM
MASTER PLAN OF STATE
HIGHWAYS ELIGIBLE FOR OFFICIAL
SCENIC HIGHWAY DESIGNATION
JANUARY 1 1972
scenic
route
LAMPMAN &
ASSOCIATES
YOSEMITE
DEATH VALLEY
KERN
SAN BERNARDINO
LOS ANGELES
RIVERSIDE
SAN DIEGO
LEGEND

# VII. PARKS AND RECREATION

| CONTENTS | PAGE |
| --- | --- |
| Inventory of Present Park and Recreation Facilities | VII-2 |
| Site Plans for Existing Facilities | VII-3-10 |

Source: City of Willits, General Plan,
Willits, California, 1974

# INVENTORY OF PRESENT PARK AND RECREATION FACILITIES

There are four parks located within the City limits. The City Park, covering one city block, is located at Commercial and Humboldt streets. The park is in lawn, and includes some play equipment on the two opposing corners, and a restroom facility. Additionally, the park contains play equipment for children on the Commercial-Marin Street corner of the Park.

The Recreation Grove is located on Commercial Street at the corner of Lenore. The area is lawn and many trees. Facilities exist for picnicing, including barbecue pits and a concession stand. A Scout Hut, restrooms, some play equipment, (Tot lot), and basketball boards are also located in the Grove.

Babcock park, a small area, is located on South Main Street, just below Howard Hospital. There are permanent benches.

The City, through arranagement with the State, has use of a strip along Highway 20, about two blocks long. The area is lawn with some trees. No facilities are located there.

Existing Recreation Facilities:

The City owns a pool, located adjacent to the High School, which is used all summer and part of the school year. The facility is operated jointly with the Willits Unified School District.

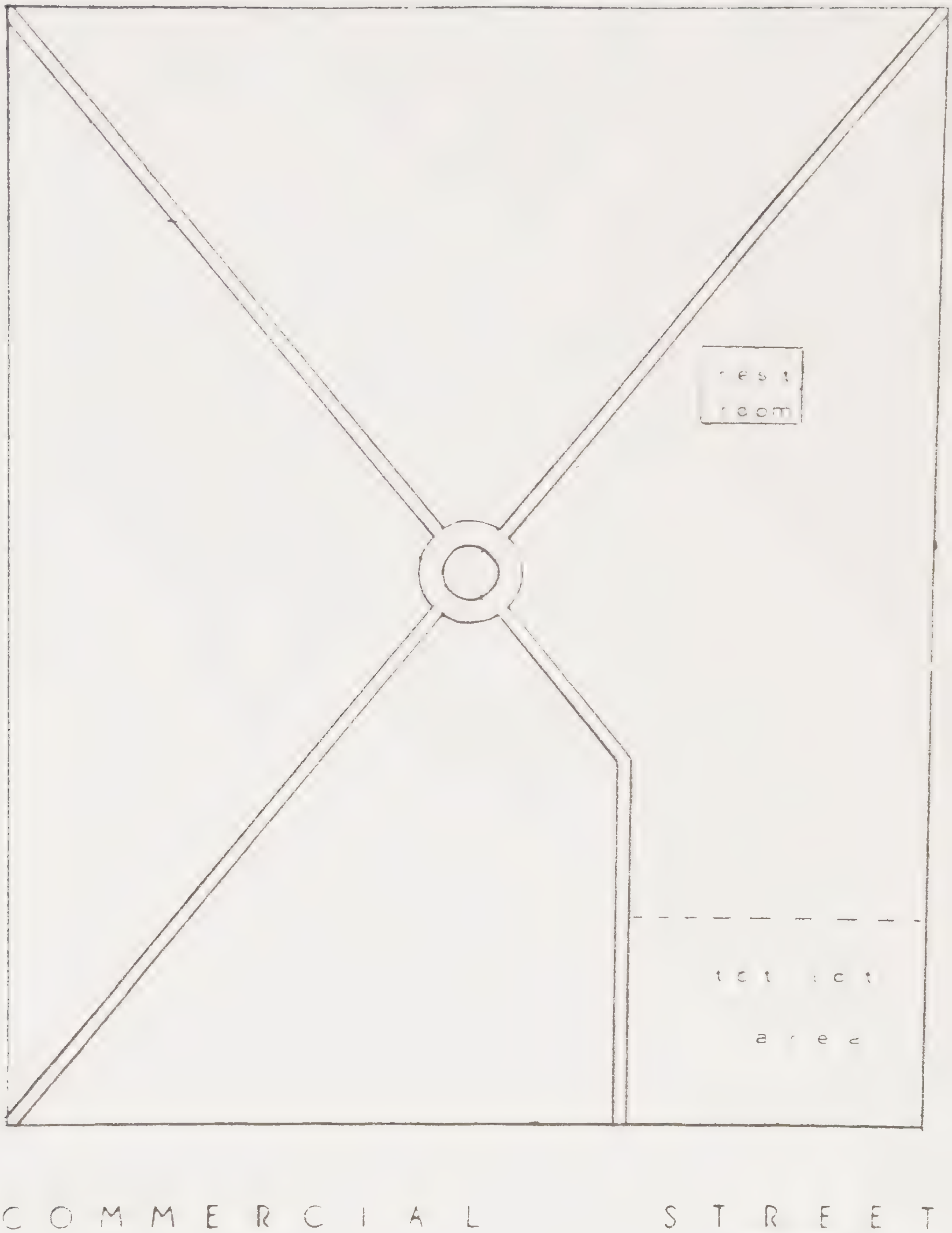
The Rodeo Grounds, located on Commercial Street adjacent to the Recreation Grove, includes a rodeo ground, bleachers, restrooms and concession stands. This facility is presently used for the City's annual Fourth of July celebration and other recreational activities.

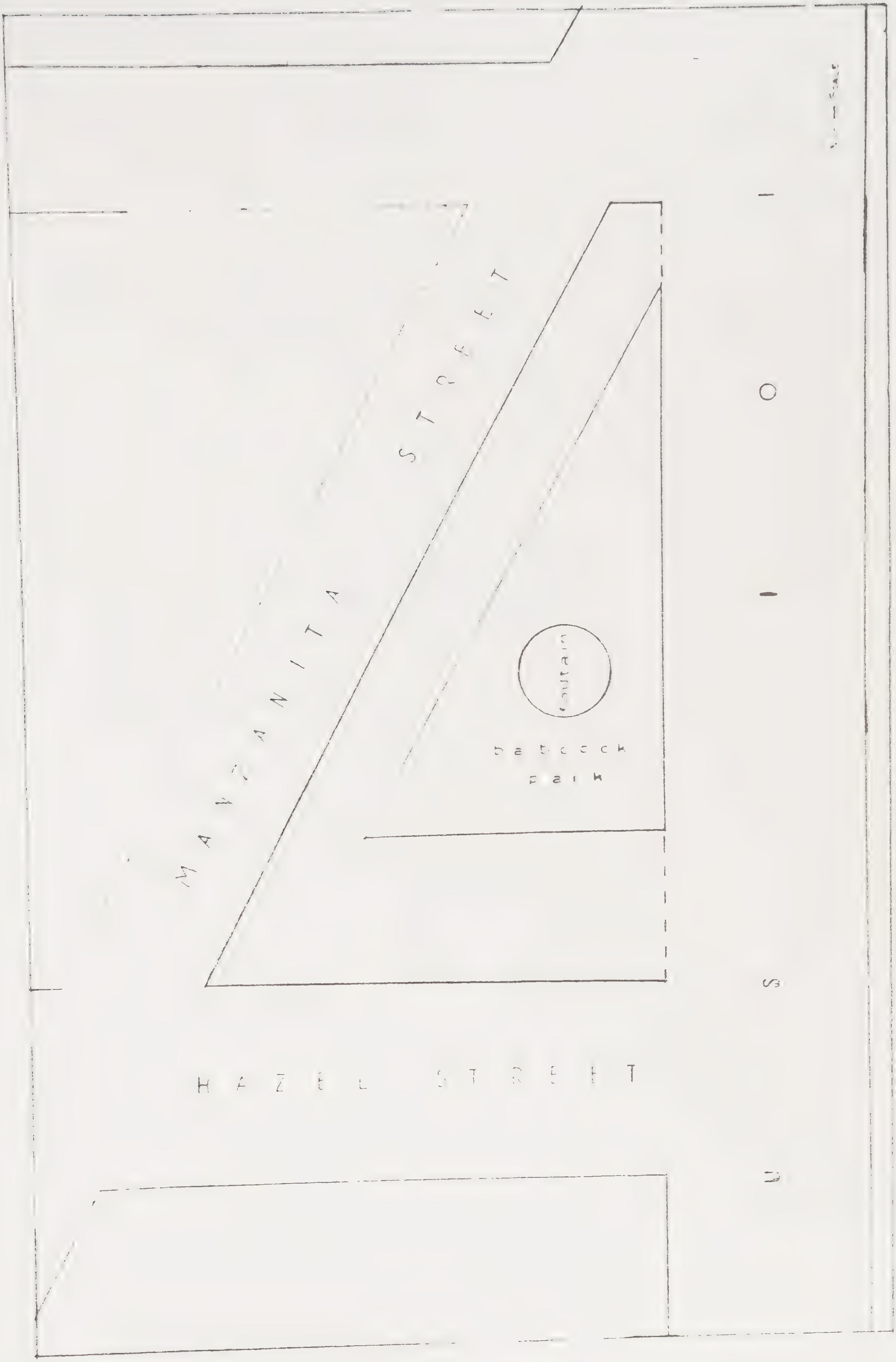
Play equipment for children, (swings, bars, merry-go-round), are located at the City Park, with a few pieces also installed at the Recreation Grove.

The City Hall is located at Commercial and Humboldt Street. The Community Center is located in the City Hall facility.

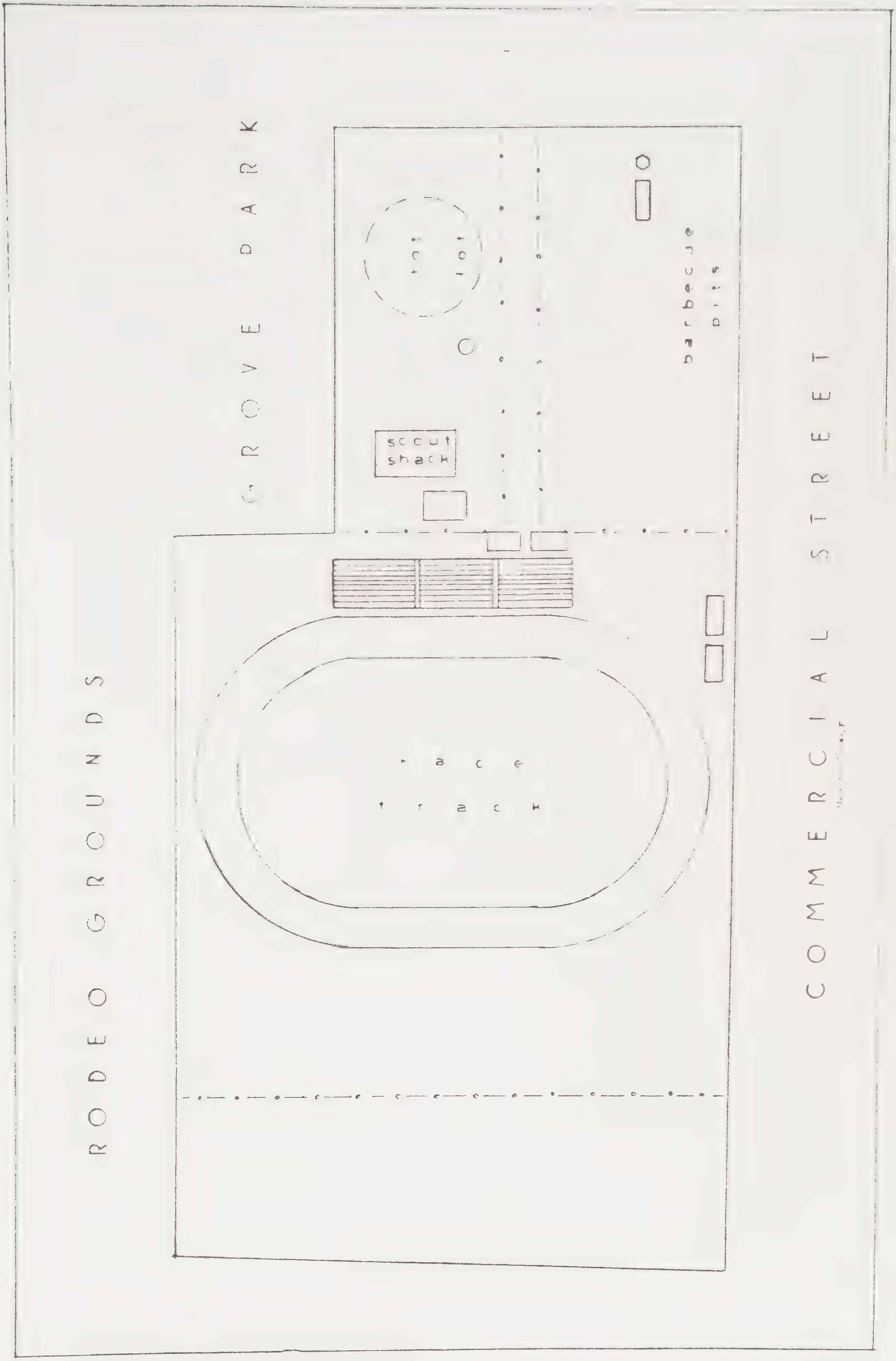
Also available to the community, on a limited basis, are the facilities on the three school campuses. The High School, located on North Main Street has a lighted football field, one unlighted baseball field, four tennis courts, and a gymnasium. Brookside School, at the end of Spruce Street, has two baseball fields. One is currently used for Little League play. Baechtel Grove School is located in the south end of town, along Magnolia Street. There are baseball diamonds there. Baechtel Grove School also has a gymnasium which was recently constructed.

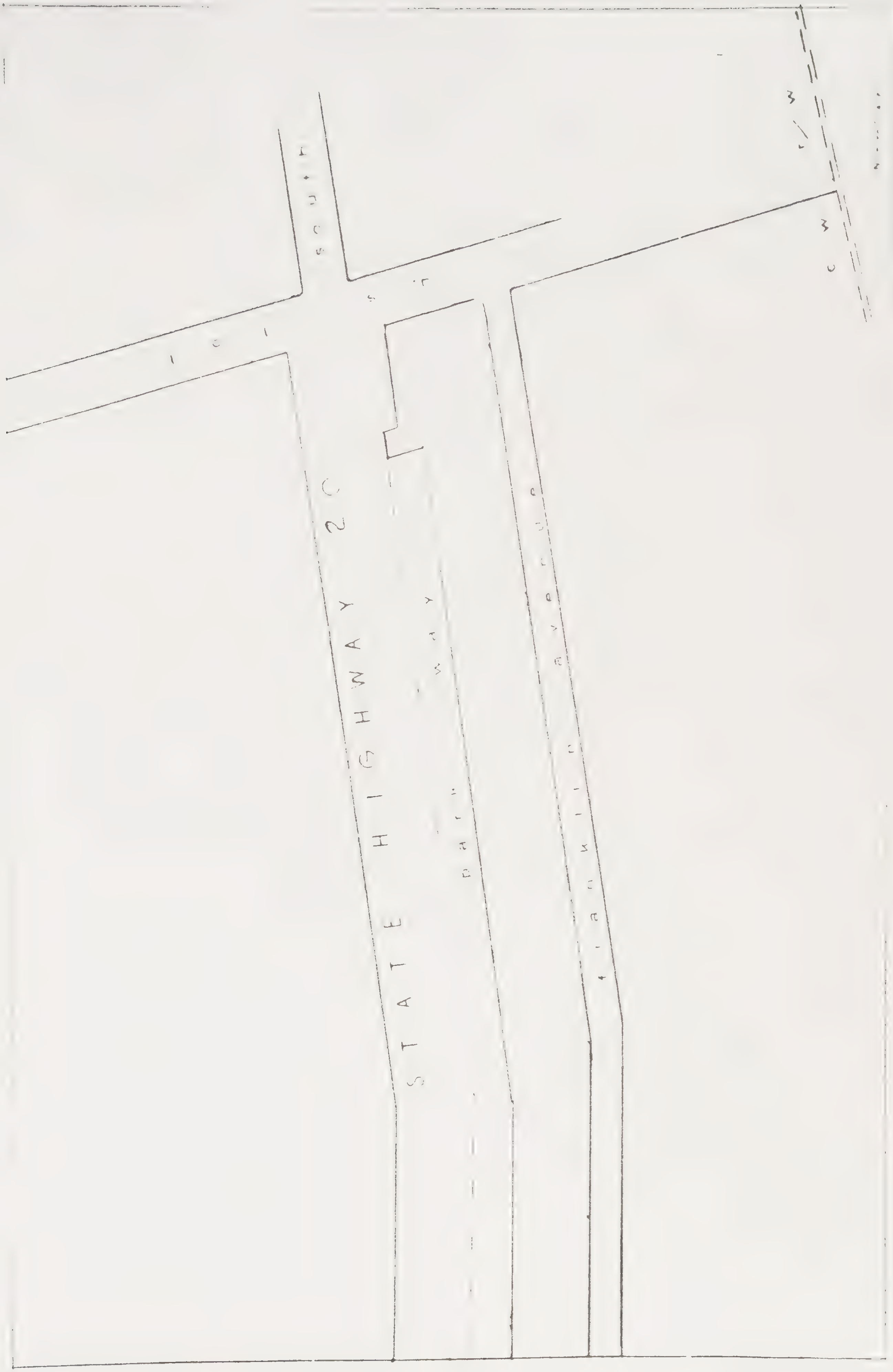
Three ball fields and tennis courts are located on Commercial Street adjacent to the Rodeo Grounds.

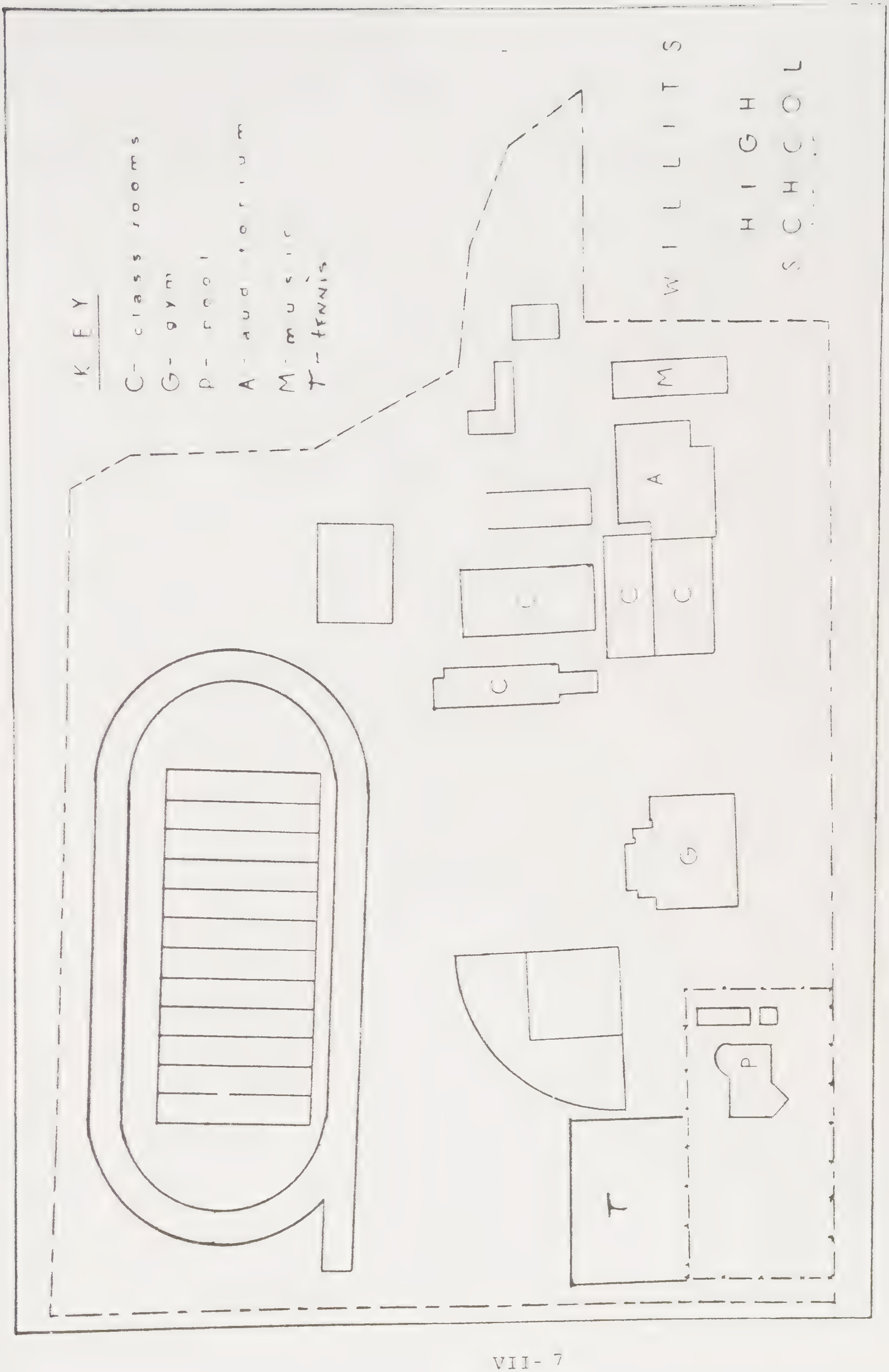

rest
room
area
COMMERCIAL STREET

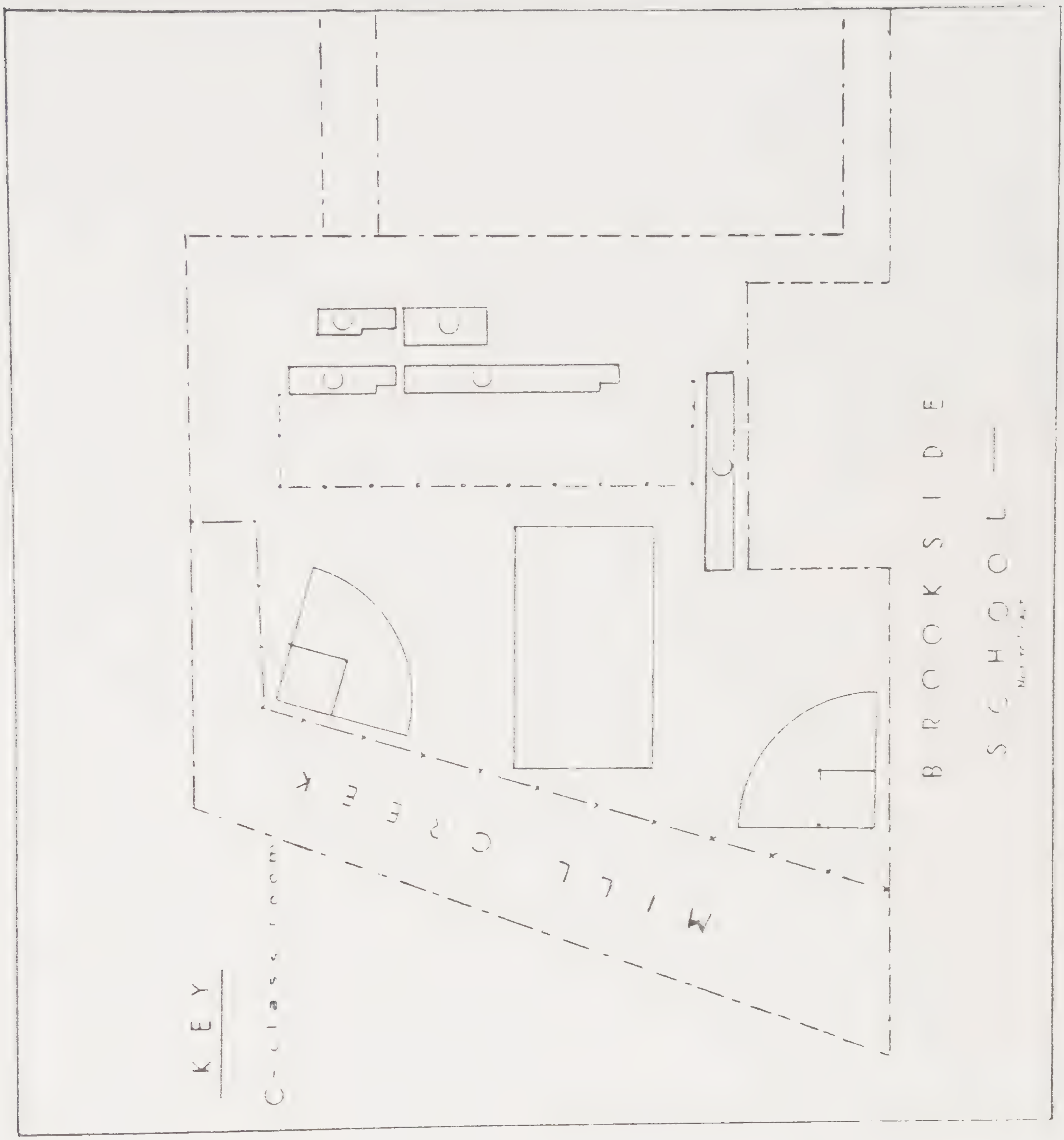


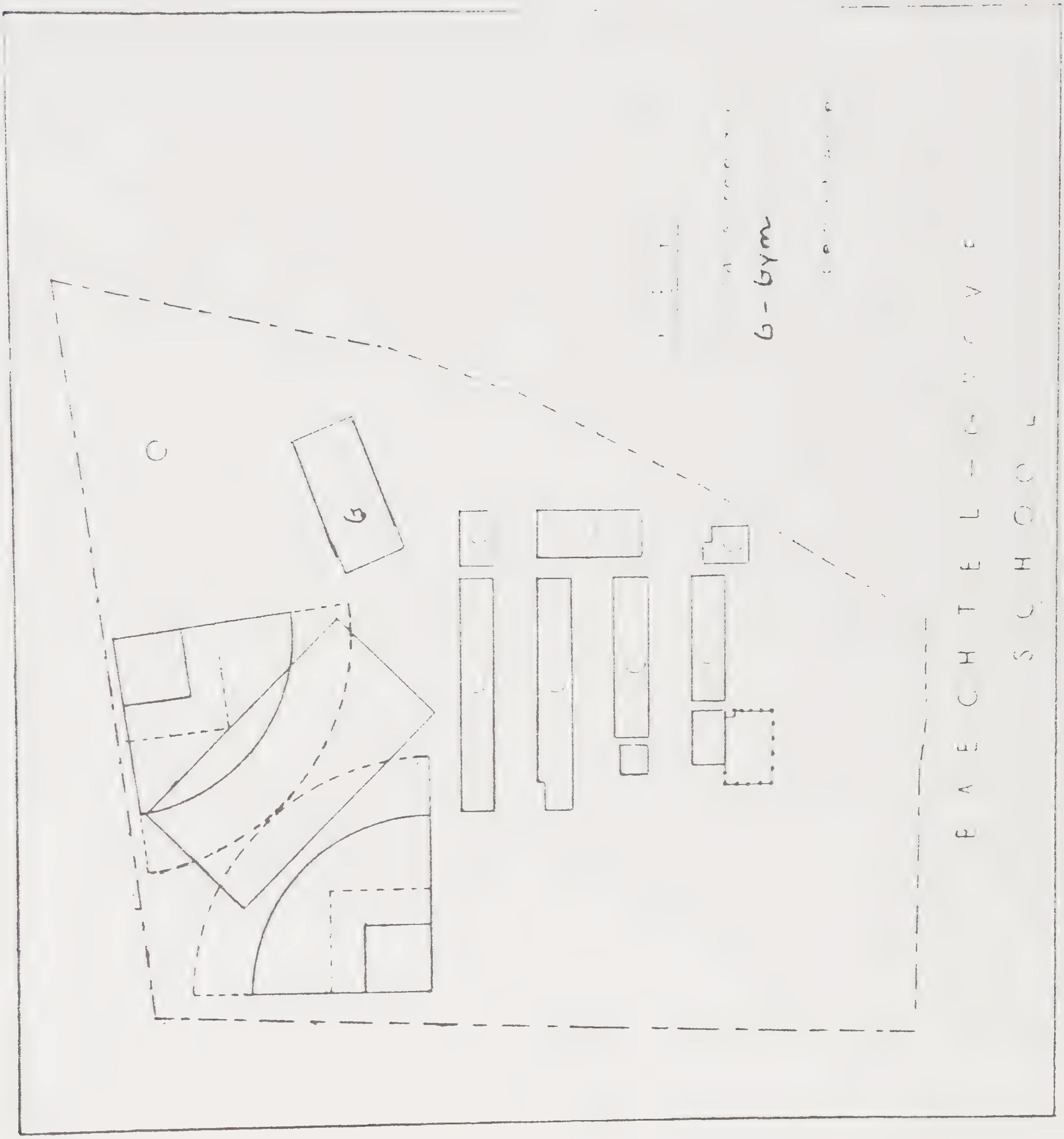
MANZANITA STREET
fountain
babcock
park
HAZEL STREET
U S 1 0 1

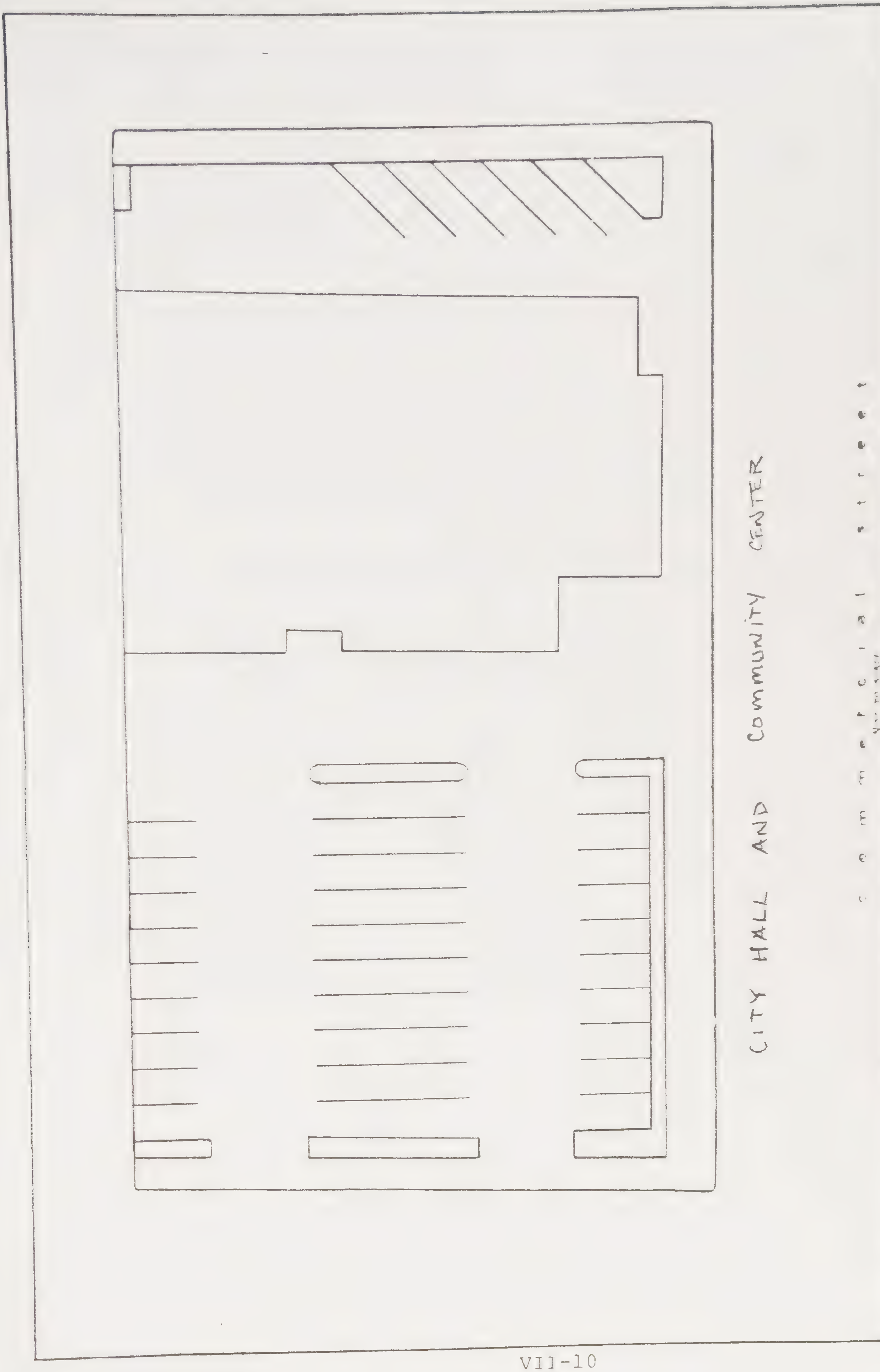

GROVE PARK
RODEO GROUNDS
COMMERCIAL STREET
scout shack
tot lot
barbecue pits
race track


STATE HIGHWAY 20


KEY
C- class rooms
G- gym
P- pool
A- auditorium
M- music
T- tennis
WILLITS
HIGH
SCHOOL
C
C
C
C
A
M
G
P
T


KEY
C - class room
MILL CREEK
BROOKSIDE SCHOOL


BAECHTEL
SCHOOL
G - Gym
G


CITY HALL AND COMMUNITY CENTER
commercial street

# VIII. NATURAL RESOURCES AND INFRASTRUCTURE

CONTENTS

## WATER SERVICE IN THE WILLITS AREA

A. Water Source

The water supply for the City of Willits is obtained from James Creek. Water is impounded by Morris Dam, located about five miles southeast of the city, and is diverted at the dam through a 14- and an 18-inch transmission line to the treatment plant.

The James Creek watershed covers an area of about five and one-half square miles and rises from an elevation of 1,542 feet at the dam to a summit of 3,058 feet in the surrounding mountains. There is no human habitation, farming, industrial operation, or organized recreational activity within the limits of the watershed. Potential sources of contamination are from trespassers, wild game, cattle, and the Northwestern Pacific Railroad. A major portion of the watershed is leased to a rancher who utilizes a small area for cattle grazing. The principal pasture area consists of several acres located about one mile upstream from Morris Lake. The lessee is limited to 35 head of cattle per month. The main line track of the Northwestern Pacific Railroad extends for 1½ miles along the southwest boundary of the watershed. At one point the track passes within 500 feet of James Creek above the impounding reservoir about two miles from the dam. Contamination from the road bed could possible be washed into the creek during heavy rains and any accidental spills from the train would go directly into the reservoir.

Morris Dam was constructed 1924-1927. It is a concrete arch dam 62 feet from the lowest part of the foundation to the crest, contains 800 cubic yards of concrete and has a crest length of 143 feet.

PG&E reports that Morris Lake has a surface area of approximately 60 acres, and a storage capacity of 651 acre-feet (212 million gallons) at an elevation of 1544 feet. With 2 foot flashboards added, the capacity is increased by 129 acre-feet (42 million gallons.) However, due to siltation in the reservoir, it has been estimated by PG&E that the total capacity of the reservoir is now only 720 acre-feet.

The intake is a concrete well structure located at the edge of the dam and is provided with two inlets - one 17 feet below and the other 36 feet below the crest of the dam. Each inlet is screened with 1/2 inch mesh bars to prevent algae clumps and small animal life from entering the transmission main. A third inlet is located at the base of the dam 9 feet from the bottom of the reservoir for emergency use and in case of extremely low water. It is not functional now because of siltation in the reservoir.

Algae growth has proven troublesome from time to time but reasonably good control has been obtained with the use of copper sulfate and bubble aeration near the intake structure.

The company's engineering report indicates that water rights for operation of the Willits Water System was obtained in two separate proceedings and provides that the company can store a total of 730 acre-feet of water in Morris Reservoir and put to beneficial use the entire amount in their Willits system.

The Kennedy/Jenks report on the system indicates that timber on the watershed can be harvested every nine years. The last timber harvest occurred in the years 1980-82 and was done in accordance with the State Forest Practices Act.

Surface water storage requirements to meet the current demands of the community without rationing have been estimated at 1596 AF and 734 AF under a most severe rationing program. (See Attachment 1). Currently the system cannot provide this capacity and as a result severe water rationing would be a necessity during low water years when summer runoff to the reservoir is minimal. Additionally, when the reservoir is drawn down to low levels, water quality problems may occur, as a result of increased iron and manganese levels and taste and odors from algae.

The general physical and chemical quality of the water supply is satisfactory except for:

1. Seasonal increases in iron and manganese. Samples collected in September 1974 from the upper and lower reservoir intake levels indicate the following:

| Parameter | Upper | Lower |
|---|---|---|
| Iron, mg/l | 0.11 | 1.2 |
| Manganese, mg/l | 0.01 | 8.2 |
| pH | 8.1 | 6.8 |
| Turbidity | 1 | 10 |

The lake turns over twice each year (spring and fall) and there is a history of taste and odor complaints when this happens, most likely due to the higher iron and manganese levels in lower lake water being brought to the surface. During the period September-October 1981, the lake level droppped below the lower intake which is 36 feet below the surface requiring use of the emergency lower intake. When this happened, manganese

levels in the system increased to over 6 mg/l, turbidity, color, and tastes and odors increased substantially and could not be effectively removed by the treatment plant. As a result there was a serious protest against the water company.

2. Corrosiveness due to low pH, alkalinity, and TDS. Water taken from the lower level of the reservoir is corrosive as measured by the Langelier Index while water from the upper level is acceptable.
3. High trubidity during periods of heavy winter runoff.

B. Treatment

Treatment of the lake water includes aeration and bluestoning at the reservoir. At the treatment plant, the process includes alum coagulation, sedimentation, chlorination, pressure filtration, and addition of lime and/or caustic soda for pH adjustment. When turbidity of the raw water is low, alum coagulation is discontinued and a cationic polymer is added as a filter aid at an average concentration of 0.10 ppm. Alum is added by means of a high pressure metering pump to the raw water as it enters the treatment plant only at certain seasons of the year when the turbidity of the raw water exceed 6 to 8 parts permillion. The normal period of alum feed is during the rainy months when the rainfall is heavy and turbidity is excessive. Turbidity is monitored continuously and the plant is equipped with automatic alarms and shutoff features if the effluent exceeds 1.0 Turbidity Unit.

A review of the operating records reveals that there is no daily control or check of the alum feed rates. Consequently, if the metering pump rate varies the alum feed rate will vary.

Chlorine is added before the clarifier by means of a V-notch proportional feed gas chlorinator with a capacity of 200 lb./day. Chlorine is also added post-filtration by means of bottle-mounted gas chlorinator with a capacity of 100 lb./day. This unit is equipped with reliability features such as automatic switch-over, alarms and automatic plant shutdown in event of failure. A minimum of 7 extra cylinders of chlorine gas is kept on hand and the lapse in tiem for achange over to a new cylinder is less than one minute. A review of operating records for the period from December 1981 through January 1983 indicates that the chlorine demand of the raw lake water varies considerably over the season from 6.2 in December 1981 to 1.7 in June 1981.

These records also indicate that the chlorine residual in the final effluent from the treatment plant varies considerably on a day to day basis during the winter months with many days exceeding 3.0 mg/l. Since it is not likely that the chlorine demand of the lake water will vary to this degree on a daily basis problems with the chlorine feed equipment or measurements are indicated. Table 3 summarizes chlorine data taken from the plant operating records for the period December 1981 to January 1983.

After the addition of alum and chlorine, the water flows into a circular, two-compartment steel tank used for coagulation and sedimentation of the raw water. Because of the soft water characteristics of the lake (i.e., low hardness, alkalinity, and total dissolved solids) coagulation/flocculation with the alum requires close pH control. Dry lime is added directly into the tank at this point for pH control in the coagulation process. The tank also serves as a chlorine contact chamber ahead of the filters. The tank is 14 feet high and has a diameter of 64 feet. An 18-foot diameter circular tank is located inside the larger tank. The interior tank is used for flocculation. It is equipped with paddles which revolve about a vertical shaft at a speed of 3 to 6 revolutions per minute to aid in the formation of the floc. The flow is controlled by an air pressure activated butterfly valve and flows into the bottom of this inner tank and out the top into a distribution trough extending along a radius of the larger outer tank. The tank has a net surface area for settling of 2963 $feet^2$ and a volume of 310,300 gallons which provides for a surface overflow rate of 0.5 $gpm/ft^2$ and a detention time of nearly 4 hours at a flow rate of 2.0 MGD. Problems with this pretreatment process include poor control of the feed rate of the alum and dry lime, inadequate mixing of the chemicals (lime and alum) before the flocculation process, and difficulty with sludge removal from the clarifier tank.

From the coagulation and sedimentation basin the water is piped to five pressure filters that contain dual media of anthracite and garnet. Three of the filters have an area of 84 square feet each, and two filters have an area of 128 square feet each, giving a total filter area of 508 square feet. These filters, when operated at a rate of 2.7 gallons per square foot per minute, can filter 3.0 million gallons per 24 hours.

The filters are presently backwashed directly from finished water. There is an old 20,000 gallon storage tank that formerly was utilized for finished water backwash storage. Backwashing is done at a rate of approximately 11 $gpm/ft^2$ and utilizes about 5 percent of the filtered water. The filter backwash water is discharged to two ponds at the plant site and is then pumped back into the raw water line to the clarifier for reuse. The filters

are backwashed either on a daily basis or loss of head (2psi). However, the head loss gages are inadequate to measure a 2 psi pressure loss.

Two fully automatic booster pumps arranged in parallel are located on the effluent side of the filters. Each pump has a capacity of 1,000 gpm. The pumps are also used to backwash the filters. A maximum of 600 gpm can flow through the plant by gravity.

In the Kennedy/Jenks evaluation of the system it was noted that there is a hydraulic constraint due to the fact that the top of the floc-sed tank at the treatment plant is only twenty-nine feet below the crest of the dam. Between the dam and the plant the 4,200 feet of transmission main requires about nine feet of head to obtain a flow of 2.0 MGD. The sizes are as follows:

| Size-inches | | Approximte Length, feet |
|---|---|---|
| Dual 12" | | 200 |
| 12" | | 20 |
| 14" | | 220 |
| 18" | | 3,760 |
| | Total | 4,200 |

Therefore only the top twenty feet of the lake is usable at demands of 2.0 MGD or greater. In the past, when reservoir levels dropped, the floc-sed tank was by-passed during the summer and early fall, in order to allow water to reach the booster pumps. This practice has since been discontinued because of the large 3.0 MGD storage tank constructed in 1979 which has provided sufficient water during peak demands for the present system. However, if extended high use conditions occur, the system may not be able to meet water demands without bypassing the clarifier. For example, if the reservoir level drops below 20 feet, the treatment plant cannot process the full 2.0 MGD. If this happens during the maximum use month which required 1.0 MGD for a full 30 days, it is not likely the demand can be met without either by-passing the clarifier or restricting water use. It is possible that this problem could be alleviated with a low-head booster pump on the raw water line to the clarifier.

## C. Distribution System

### Storage

There are a total of 6 storage reservoirs in the system with a combined volume of 3,407,000 gallons.

The main storage tank for the system is a new 3.0 MG steel tank constructed in 1979. The level in this tank controls thc booster pumps at the treatment plant and pressures within a major portion of the community. The tank is in excellent condition.

Two storage reservoirs located in the southern section of the city are fed by booster stations off the main trunk line from the treatment plant. Those include Berryhill, a 34,000 gallon redwood tank, supplied by a 10 HP pump, and serving approximately 50 customers; and Laurel Street, a 43,000 gallon redwood tank supplied by a 5 HP booster serving approximately 60-70 customers. Two storage reservoirs, located in the norther section of the city, balance on the distribution system. Sherwood reservoir is a 110,000 gallon concrete basin constructed in 1930. The wall of this reservoir extends 6 to 24 inches above ground level, and no surface drainage to the reservoir is possible. The reservoir is covered with a corrugated iron roof that is in need of repair. There are also cracks in the concrete. The other storage reservoir is a covered 200,000 gallon steel tank known simply as the steel tank constructed in 1950. A pressure system supplied by a 50 g.p.m. centrifugal pump is located on the tank site. This system serves a few consumers above the steel tank. Both receive water from and deliver water to the distribution system through Clayton valves. However, the 200,000 gallon steel tank is not being used at the present time because of problems with hydraulics and stagnation of the water.

A 20,000 gallon redwood tank known as the Locust Street Tank serves approximately 35 customers on a high area on the west side of town. This tank was constructed in 1949. A redwood plank and tar paper roof covers the tank. A 7.5 HP 4-stage turbine pump boosts water from the main distribution system to this high service area. The booster pump operates automatically by means of water level controls in the 20,000 gallon tank. This tank is in very poor condition and should be replaced.

### Mains

The distribution system consists principally of asbestos cement (approximately 80% within last 3 years) and old welded steel and cast iron mains. According to the 12/31/81 PUC data, there is a total of 169,000 feet in the system of which 8,000 feet is 2-inches or less in diameter. There are approximately 50 deadend mains in the system.

The system is regularly flushed twice/year during the period May to November. Disinfection of new mains is carried out in accordance with the City Code which complies with State requirements.

About 75 percent of the service area is served with a minimum of 40 pounds per square inch pressure. About 25 percent of the service area has only about 25 psi pressure which was all that was required from 1956 to 1975. Booster pumping is required during the evening hours to maintain the 40 psi minimum pressure to most of the service area. In addition, there are about six small zones which have hydropneumatic tanks or standpipe tanks to serve the higher elevations. Regularly scheduled pressure surveys as required by PUC Order 103 should be conducted to insure that adequate pressures are being maintained throughout the system.

Little Lake Water Company

Water Production and Use 1973-82

| M | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 198 |
|---|---|---|---|---|---|---|---|---|---|---|
| erage Daily oduction MGD | 0.912 | 0.995 | 0.990 | 0.865 | 0.573 | 0.889 | 1.100 | 1.105 | 0.92 | 1.1 |
| erage Daily nsumption MGD | 0.686 | 0.751 | 0.779 | 0.726 | 0.434 | 0.644 | 0.689 | 0.678 | 0.68 | - |
| ak Day oduction MGD | 1.76 | 2.009 | 2.005 | 1.765 | 0.955 | 1.748 | 1.997 | 1.972 | 2.20 | 1.8 |
| ximum Month | 42.3 | 45.6 | 44.7 | 39.4 | 23.9 | 42.6 | 47.1 | 50.5 | 58.9 | 49. |
| . of Connections | 1581 | 1610 | 1642 | 1682 | 1729 | 1797 | 1842 | 1874 | 1956 | 196 |
| erage Peak Month r connection, gpd | 865 | 914 | 878 | 756 | 450 | 765 | 825 | 870 | 971 | 80 |
| ak Day/Connection d | 1110 | 1250 | 1220 | 1050 | 553 | 1010 | 1085 | 1050 | 1125 | 96 |
| erage Day/ nnection gpd. | 576 | 618 | 603 | 515 | 332 | 495 | 596 | 590 | 470 | 58 |
| rcent Water accounted | 24.8 | 24.6 | 21.3 | 16.1 | 24.3 | 27.6 | 37.4 | 38.7 | 26.1 | - |

TABLE 1

Willits Population and Water Service

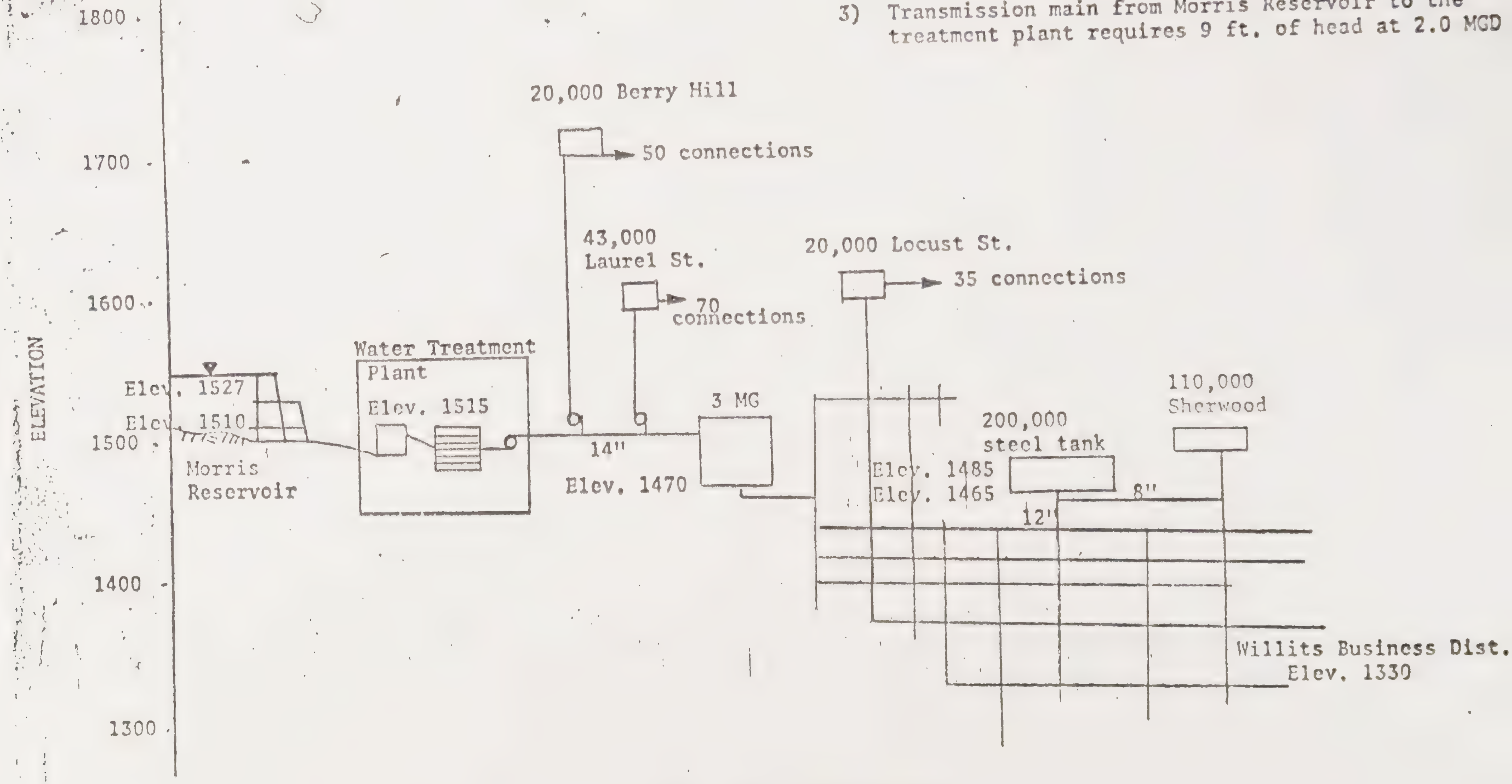
Connections 1940-1981

| YEAR | POPULATION | WATER SERVICE CONNECTIONS |
|---|---|---|
| 1940 | 1625 | |
| 1950 | 3650 | 914 |
| 1953 | 3500 | 1230 |
| 1962 | 3800 | 1388 |
| 1974 | NA | 1610 |
| 1976 | NA | 1682 |
| 1978 | NA | 1797 |
| 1981 | 6000 | 1956 |

Notes: 1) 200,000 gallon steel tank controlled by altitude valve that opens at elevation 1485

2) 110,000 gallon concrete tank controlled by altitude valve that opens at elevation 1495

3) Transmission main from Morris Reservoir to the treatment plant requires 9 ft. of head at 2.0 MGD




LITTLE LAKE WATER COMPANY
SCHEMATIC

FIGURE 1

| Month | Estimated Evaporation | DOMESTIC USE | | | TOTAL DEMAND | | |
|---|---|---|---|---|---|---|---|
| | | Average Annual | Average Drought | Low Drought | Average Annual | Average Drought | Low Drought |
| JANUARY | 2 | 70 | 63 | 45 | 72 | 65 | 47 |
| FEBRUARY | 5 | 72 | 65 | 50 | 77 | 70 | 55 |
| MARCH | 6 | 74 | 67 | 50 | 80 | 73 | 56 |
| APRIL | 8 | 74 | 67 | 50 | 82 | 75 | 58 |
| MAY | 11 | 94 | 66 | 55 | 105 | 77 | 66 |
| JUNE | 13 | 128 | 90 | 70 | 141 | 103 | 83 |
| JULY | 14 | 166 | 116 | 90 | 180 | 130 | 104 |
| AUGUST | 11 | 162 | 114 | 90 | 173 | 125 | 101 |
| SEPTEMBER | 7 | 142 | 100 | 80 | 149 | 107 | 87 |
| OCTOBER | 4 | 111 | 78 | 60 | 115 | 82 | 64 |
| NOVEMBER | 2 | 80 | 72 | 55 | 82 | 74 | 57 |
| DECEMBER | 1 | 76 | 68 | 50 | 77 | 69 | 51 |
| | 84 | 1249 | 966 | 745 | 1333 | 1050 | 829 |

TABLE A-1

Distribution of Water Consumption
Little Lake Water Company 1973 - 81

| MONTH | 1973 | 1974 | 1975 | 1979 | 1980 | 1981 | Period Avg. |
|---|---|---|---|---|---|---|---|
| Jan. | 7.0 | 5.9 | 6.4 | 5.8 | 5.6 | 3.0 | 5.6 |
| Feb. | 5.8 | 5.8 | 5.7 | 5.6 | 5.9 | 6.0 | 5.8 |
| Mar. | 6.6 | 6.0 | 5.7 | 6.2 | 5.7 | 5.0 | 5.9 |
| April | 5.8 | 5.8 | 5.4 | 5.8 | 6.0 | 6.5 | 5.9 |
| May | 8.1 | 7.3 | 6.8 | 7.4 | 6.9 | 8.2 | 7.5 |
| June | 11.1 | 11.0 | 11.6 | 10.4 | 9.6 | 7.7 | 10.2 |
| July | 12.3 | 11.5 | 12.5 | 12.0 | 12.5 | 18.8 | 13.3 |
| Aug. | 12.6 | 11.8 | 12.4 | 13.0 | 12.5 | 15.9 | 13.0 |
| Sept. | 11.1 | 12.5 | 11.5 | 10.6 | 13.5 | 9.2 | 11.4 |
| Oct. | 7.2 | 9.8 | 9.2 | 10.1 | 8.9 | 8.4 | 8.9 |
| Nov. | 6.2 | 6.9 | 6.4 | 6.4 | 6.4 | 5.9 | 6.4 |
| Dec. | 6.1 | 5.7 | 6.3 | 6.7 | 6.5 | 5.2 | 6.1 |
| | 99.9 | 100.0 | 99.9 | 100.0 | 100.0 | 99.8 | 100.0 |

WASTEWATER TREATMENT PLANT EXPANSION
PHASE I REPORT

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

1. Problems mentioned by the plant operating staff during plant inspections included:

    a. Unreliability of the inlet sluice gate control system.

    b. Flooding problems and general plant vulnerability to major floods.

    c. Hydraulic limitations of the distribution structure.

    d. Inability to use the waste activated sludge pump for return activated sludge service under low recycle conditions.

    e. Inflexibility of operation of the aerobic digester.

    f. Inadequacy of the sludge drying beds.

2. The existing plant site precludes expansion unless holding ponds are converted to other purposes. Properties to the north and west of the existing plant could be used effectively for future plant expansion.

3. A hydraulic "model" of the Willits plant was developed so a complete hydraulic profile through the plant could be developed under a range of flow conditions.

4. The hydraulic capacity of the plant is a function of both plant inflow and process recycle flow. The total flow through much of the process is the sum of these two flows. Recycle flow cannot be completely controlled or eliminated inasmuch as treatment efficiency requires recycle.

5. Analysis indicates that the peak wet weather capacity of the existing plant is approximately 2.5 to 2.8 MGD depending on recycled flow. The design capacity of the plant is stated to be 2.4 MGD. The total flow limitation appears to be approximately 3.1 MGD and is reached in the distribution structure ahead of the aeration basins and in the aeration basins themselves. The clarifier weir floods out at approximately 2.8 to 3.0 MGD.

6. Adding two to three feet of freeboard to the distribution structure and aeration basins will increase plant hydraulic capacity expressed as plant inflow to 3.0 MGD.

7. Major piping and process modifications are required to increase plant peak wet weather capacity above 3.0 MGD plant inflow.

8. Influent BOD and suspended solids records do not appear to accurately characterize the raw waste. It is believed influent conditions are too variable to be accurately described by one BOD and four suspended solids analyses per month. For analytical purposes, a BOD concentration corresponding to the actual population served by the plant was used. Other plant records were found useful in analytical work but are not detailed enough to permit a precise kinetic analysis of plant operations.

9. A process "model" was developed that permitted 40 to 50 runs to be made simulating various assumptions regarding flows, waste strength and process variables and coefficients. The scope of work called for two runs only. Utilization of the process and hydraulic models greatly improved the analytical process.

10. The oxygen transfer capability of existing mechanical aerators was determined as directed by the scope of work. A transfer rate of 2.3 pounds of oxygen per Hp-hour is applicable to both wintertime and summertime conditions. This figure was derived from standard equations for calculating transfer efficiency and from manufacturer's data. This value has been used in process analytical work.

11. Process analysis showed that the aeration basins and aerators are adequate for all flow conditions

simulated which includes the design average dry weather flow of 0.64 MGD, an estimated 1990 average dry weather flow of 1.75 MGD as well as peak wet weather flows for both design and 1990 conditions up to 3.0 MGD. Thus, hydraulics, not process, limit plant capacity.

12. The clarifier is overloaded at flows exceeding roughly 2.6 MGD based on normal operating criteria but operating experience has shown that this unit can, in fact, perform at flows up to 3.0 MGD without appreciable solids carryover. Tube settlers can be installed in the existing clarifier to improve operations should solids carryover be a problem in the future.

13. Because operating records do not allow an accurate definition of process coefficients, a full-scale operational test should be performed this summer to determine the coefficients. This will provide a basis for future design modifications to increase plant capacity.

14. Sludge processing has been the prime plant operating problem since the plant went into operation. The drying beds are marginally adequate during the summer but are virtually unusable in the winter requiring the operator to accumulate solids in the aerobic digester and process units. The latter is contrary to desired process operation under high flow conditions. The aerobic digester is difficult to operate in a batch, "fill-and-draw" mode, particularly in the winter.

15. Current summertime sludge production is approximately 500 pounds per day of digested sludge. For 1990 loadings, sludge processing facilities must provide capability for treating approximately 1,500 pounds per day.

16. The existing aerobic digester can operate with loadings greater than design but this is inconvenient. For 1990, another aerobic digester with better operating flexibility as well as additional capacity will be needed if drying beds, lagoons (or holding basins), are used for sludge processing.

17. The scope of work directed that lagoons (or holding basins), improvements to the sludge drying beds, and the EBC Company process be investigated. Lagoons and beds require aerobic digestion as

pretreatment. The EBC Company process does not. The option of using lagoons and drying beds in conjunction is also viable.

18. Any sludge processing scheme must meet the following criteria:

    a. Allow the treatment process to operate efficiently.

    b. Keep operator time for solids processing to a minimum.

    c. Provide for anticipated 1990 loadings.

    d. Provide backup capability for reliability.

19. A sludge drying bed option will require approximately three times the existing bed area to meet 1990 loadings. A new vacuum assisted dewatering system for sludge drying beds which is currently coming on the market may be worth investigating. Conventional beds remain a good summertime drying technique and can provide effective backup to other solids processing schemes but may be of limited usefulness as the principal means of dewatering sludge for Willits because of wintertime conditions and increasing plant size.

20. Preliminary lagoon and holding basin designs and layouts have been prepared to be located on the property north of the existing plant. These can be phased and integrated with future aeration basins and aerobic digesters.

21. The EBC Company process is an extremely attractive alternative to conventional sludge processing methods (1) if reliability can be demonstrated and (2) if the process is cost-effective. A major advantage of the process is that sludge can be removed at the point of separation, namely the clarifier, and thus eliminate all sludge processing equipment including the aerobic digester saving considerable power and labor costs. Disposal of dried sludge, currently classified as a hazardous substance by EPA, is virtually eliminated inasmuch as sludge is incinerated and reduced to inert material. This process also offers the possibility of energy production either through on-site generation or through direct drive of key equipment by steam. The process is, however, unproven except for the

pilot work underway at the Willits plant. It is recommended that this process be put on line and run continuously during the recommended full-scale operational test.

22. The physical plant and plant operations are highly vulnerable to flooding under major storm conditions resulting in disruption of operations and the potential of major damage to electrical and mechanical equipment.

23. The 100-year storm stage was estimated by Brown and Caldwell from Corps of Engineers data to be approximately elevation 1,352 feet. This is one foot above the top floor elevation of the operations building. Such a flood would inundate all plant units except the aeration basins, clarifier and aerobic digester. The recollection of plant operating staff more-or-less confirms the validity of this flood stage estimate. Recent work done under the FEMA program indicates 100 year flood stage may be slightly lower.

24. Diking to an elevation of approximately 1,352.5 feet would prevent flooding under assumed 100-year storm conditions. Diking of the main plant area, excluding the drying beds but including the three smaller holding ponds, would prevent damage to plant components. All future facilities constructed should be flood-proofed to this elevation.

25. Based on plant inflow data from the December, 1964 storm, the combined treatment capacity of 2.4 MGD for the existing plant and holding pond capacity of 16 MG is inadequate. For a 2.4 MGD plant, 35 MG of holding pond capacity is required to operate under 1964 storm conditions. Alternatively, a 4.8 MGD plant would only require 12 MG of holding pond capacity. The holding pond concept for peak flows becomes unworkable as a greater percentage of plant capacity is allocated to dry weather flows because less capacity is then available to treat return flow from the holding ponds.

26. While a major plant expansion in increments to a total capacity of 4.8 MGD will be needed during the next ten to fifteen years depending upon the rate of growth of the service area, this does not mean all facilities will require duplication. Alternate processes and arrangements

should be investigated that may be cost-effective for treating short-term peak flows.

27. Low lift pumps are needed to permit discharge of treated waste during flood conditions when flow by gravity is impossible.

28. A standby generator to keep key plant equipment in operation during power outages is needed. If the EBC Company sludge process is chosen, an equivalent to standby generation capability may be available through on-site energy recovery from that process.

29. Preliminary costs developed for first phase improvements include items to increase peak wet weather hydraulic capacity by approximately 0.3 MGD ($38,000), items to correct two reliability-related problems ($7,000), items to flood-proof the plant (essential items total $232,000) and four first-phase only sludge processing options (capital cost range from $5,000 to $156,000).

Recommendations

The following course of action is recommended to increase the capacity of the Willits Wastewater Treatment Plant and to improve reliability of operation:

1. After City review and approval of the preliminary design report, a meeting should be arranged with the North Coast Regional Water Quality Control Board to describe Willits' plan for plant improvements. Input should be obtained from the Board on specific requirements they may have.

2. A full-scale operational test of the plant process and EBC Company sludge processing scheme should be undertaken to determine process rate coefficients and sludge quantities and to determine performance characteristics, costs, and reliability of the EBC Company process.

3. Undertake the design and construction of the hydraulic capacity and reliability feature components of the first phase improvement program.

4. Begin implementation of infiltration/inflow program.

5. Perform final process calculations for the existing plant using the results of the full-scale operational tests as a basis for future process improvements.

6. Evaluate the EBC Company process and compare with lagooning and drying bed options. Select and implement the most cost-effective sludge processing scheme.

7. Prepare an engineering predesign report for a second phase expansion of wastewater treatment facilities based on treating an average dry weather flow of 1.75 MGD with capacity for processing a peak wet weather flow of 4.8 MGD.

8. Acquire necessary property for plant expansion requirements.

9. Undertake design and construction of the flood protection program as funding permits.

10. Implement the plan for second phase plant expansion as required by growth within the service area.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

1. The average dry weather flow (ADWF) from Willits and Brooktrails now averages 0.40 and 0.15 mgd respectively, which totals 0.55 mgd. It now appears that the 1.75 mgd ADWF capacity of the plant will be adequate for at least 20 years. The North Coast Regional Water Quality Control Board's (NCRWQCB) position regarding ADWF capacity is that plant performance will dictate when improvements and/or expansion are needed. Operator skill will undoubtedly play a large part in meeting discharge requirements as ADWF approaches the calculated limit. A 0.9 to 1.0 mgd capacity should suffice to at least 1990.

2. A major problem at the plant is lack of capacity for treating peak wet weather flows (PWWF). The magnitude of PWWF is largely independent of the ADWF and the population in the area served. A plant capacity of 4.8 mgd and 12 mg of peaking storage are needed to avoid bypassing raw waste under 100-year storm conditions. This means 1.8 mgd of additional treatment capacity is needed over and above the 3.0 mgd that will be available at the existing plant once the Phase I improvements have been completed.

3. Peak flows of greater than 3.0 mgd occur infrequently when measured on an annual basis (i.e., 5 to 10 percent of the time during a typical year). Therefore, operating costs for stormwater treatment facilities is not of major importance, but minimizing capital costs is particularly important because of the low benefit-to-cost ratio of these facilities.

4. Costs were developed for three conventional secondary treatment alternatives to establish a base cost level for 1.8 mgd of additional capacity. The costs for these improvements ranged from $2.1 to $ 2.5 million exclusive of sludge processing facilities.

5. Two alternatives were developed to convert the existing holding pond system to aerated lagoons.

6. A conventional shallow lagoon design was prepared which utilized Ponds 1, 2, 4 and 5. This alternative did not include raising pond dikes to prevent flooding. The project cost was estimated to be $1,030,000. A total of 140 horsepower in aerator capacity would be required under this scheme.

7. The second aerated lagoon alternative was based on a high efficiency, short retention time concept. This scheme requires deeper lagoons to minimize aerator requirements. The design concept includes raising the dikes surrounding Ponds 1, 2 and 3 by 4-1/2 feet to achieve the needed depth and provide the flood protection recommended in this firm's Phase I report. Thus, under this scheme, the dikes are made to perform two functions. The alternative utilizes flexible partitions in the ponds to create the individual cells needed for treatment. These keep costs down and may be relocated in the future to accommodate other flow conditions. Aspirator-type propeller aerators are used to minimize installed horsepower and to provide maximum flexibility. The estimated project cost for these improvements is $814,000 which includes the diking provisions recommended in Phase I for the main plant and pond area. The NCRWQCB has suggested that this scheme first be implemented without aerators. They believe that low ambient wintertime temperatures may suppress biological activity to a degree not requiring mechanical aeration. In any event, aerators and appurtenant wiring can easily be added after the dikes are raised and partitions constructed if so required. Eliminating, or deferring, aerators and associated electrical work will reduce project costs approximately $230,000.

8. It is possible that this aerated lagoon scheme may be more efficient for use on a year-around basis than the existing plant. This possibility can be explored during the summer on a pilot basis once the recommended improvements, including aerators, are in place.

9. Sludge production at the plant is now in the 800 to 1,000 pound per day range (dry solids basis). At a 1.75 mgd ADWF, approximately 3,000 pounds of sludge will be generated each day. Because several of the sludge processing schemes considered lend themselves to incremental construction, a two-stage approach has been used in developing and costing sludge treatment alternatives. A 1,500 pound per day capacity would provide for an average dry weather flow of approximately 0.9 mgd and is used as the first stage basis of design for sludge processing alternatives where staging is possible.

10. Various individual processes considered most suitable for the Willits plant were combined into five sludge processing alternatives. These are by no means the only possible sludge processing schemes. The reliability and flexibility of each alternative was evaluated. Capital costs, operation and maintenance costs and total costs were developed for a twenty year period for each alter

11. Specific locations for disposing of treated and dried sludge were not investigated in detail. The City currently gives dried sludge away for use as a soil conditioner. The dried sludge is blended with sawdust and composted onsite prior to use. State Department of Health Services (DOHS) staff have indicated concern about the potential for disease transmission through misuse of the sludge-based soil conditioner. They have stated that DOHS regulations regarding this means of disposal must be followed and that users must be informed of potential hazards. With the current state of flux in sludge disposal regulations and with changes certain to occur in the future in the availability of disposal options, the City should, in this firm's opinion, adopt the strategy of selecting a sludge treatment process with enough flexibility to accommodate future changes in disposal options and requirements. Disposal options that may be viable for Willits include use of composted sludge as a soil conditioner, landfilling applications and dedicated land disposal as well as incineration. Incineration is the only option that completely destroys organic material thus eliminating any possibility of a health hazard regardless of the means used for subsequent ultimate disposal.

12. Four of the five sludge processing alternatives investigated use of aerobic digestion for the sludge stabilization phase of the process. While this process is less energy efficient than anaerobic digestion, it is much easier to operate and capital costs are lower for small plant applications. An important consideration is the fact that the City now uses aerobic digestion. The existing digester will be adequate for first stage sludge processing requirements, providing some relatively minor changes are made to the aerator mounting. A second digester will be needed for the second 1,500 pound per day increment to complete the Phase II plant.

13. Alternative 1 employs sand drying beds in the summer and sludge drying lagoons in the winter. This alternative is relatively cheap for the first stage but becomes expensive and is cumbersome operationally as the plant grows because of the number of drying beds and lagoons required. There is also a risk of odors associated with the use of drying lagoons.

14. Alternative 2 uses an aerated holding basin to store sludge during the winter. Sand drying beds are then employed to dry the wintertime accumulation of sludge from the holding basin as well as the sludge produced during the summer. While this scheme is simple to operate and presents little odor potential, it is expensive both in terms of capital investment and operation and

maintenance costs. Power to run the aerators in the mixing basin is a substantial cost. Because the entire year's sludge production must be dried in six months or less, the land area and labor requirements for maintaining sand drying beds are large.

15. A sludge sample sent to the manufacturer of vacuum-assisted drying bed equipment (Alternative 3) was tested to establish the treatability of Willits sludge and to allow a capital and operating cost estimate to be prepared. This system works year-around with little space required. The beds should be covered to exclude precipitation. Pilot testing resulted in capital costs increasing somewhat over those shown in the Phase I report. Another high rate drying bed process, the "wedgewire" system, was investigated but was not pilot tested. This drying bed variant may be slightly less costly than the vacuum-assisted bed, but will produce a slightly wetter sludge - a disadvantage.

16. Alternative 4 employs a small belt filter press for sludge dewatering. The compactness and flexibility of this device is a major advantage. Capital costs are low but operation and maintenance costs are relatively high using this process. It is believed that polymer use, a major operating cost component, can be reduced somewhat if a sludge moisture content equivalent to that provided by the other processes is acceptable. Initially, this unit could process all the sludge generated at the plant in less than forty hours per week. Truck-mounting the equipment to serve several plants is also technically feasible if institutional arrangements can be made for cost-sharing with other wastewater entities. The unit, or units, must be pilot-tested to establish feasibility for Willits and to permit design criteria and costs to be firmed up to premit comparison with other alternatives. City staff has indicated a pilot-test will be made in the near-future.

17. Costs for Alternative 5 are based on the Kleensmoke proposal to the City made in March, 1982. Kleensmoke has revised the original proposal somewhat following discussions with staff and this firm to include a full-scale operational test at no cost to the City. The original proposal and the letter amending the proposal and commenting upon the sludge processing aspects of the draft version of the Phase II report are included as Appendix D. The cost for this process is the lowest of the five alternatives. This is the only process investigated, however, which has not been operated at plant scale.

18. It is recommended that the City determine the feasibility of the Kleensmoke system by undertaking a full-scale operational test. Consideration should also be given when planning this test so that all needed data may be collected to determine feasibility and costs for utilization of the incinerator (i.e., the "Inverse Pile Burner") in conjunction with either the belt filter press, the vacuum assisted drying bed, or with the recently-investigated (i.e., by Kleensmoke) sludge filter bag system.

19. After completion of pilot testing work for Alternatives 4 and 5, a revised cost analyses should be made in order to select the least-costly alternative. Costs should also be developed for utilizing Kleensmoke incineration capabilities with both Alternatives 3 and 4 and with the sludge filter bag system.

20. Diking of the main plant area and Ponds 1, 2 and 3 accomplished when constructing a wet weather treatment plant would also meet the flood protection needs outlined in the Phase I report. It is doubtful if it is cost-effective to dike Ponds 4 and 5 because of low use (i.e., slight benefit) and relatively high cost. The escalated cost for performing this work would be approximately $220,000. This diking work (i.e., for Ponds 4 and 5) has not been included in the recommended Phase II plan.

21. Consideration should be given to using a standby power generator as the prime power source for aerators required for the wet weather treatment plant, if any are needed, and for powering the stormwater pumping equipment. Doing this will prevent a high demand charge component from being added to the City's bill from PG&E. To optimize use of the generator, it may be desirable to transfer the full power load of the plant to the generator under storm conditions inasmuch as the generator must be exercised periodically anyway. A 400 kw generator with weatherproof enclosure, pad and all electrical switchgear would cost approximately $125,000.

22. Stormwater pumping facilities may be incorporated irto the cut-in manhole structure required for the wet weather treatment plant facilities. Two large 5 mgd pumps would be mounted atop this structure. The cost for pumping equipment, gating and necessary controls would be approximately $50,000.

23. Willits must dispose of effluent by irrigation between May 15 and September 30 of each year because discharge to the creek system is prohibited at those times. The City can now dispose of all effluent produced on crop land owned by the City or through arrangements with

local farmers. The effluent produced by the plant meets State health requirements for this type of application.

24. The City supplies water to Grove Park and the high school playing fields because reclaimed water is currently the only available source of irrigation water for these areas. The local water purveyor is unable to meet these demands. The treatment afforded at the plant does not presently meet the strict definition of treatment required for application of reclaimed wastewater to parks and playfields. Specifically, the State believes filtration is necessary to achieve the stringent disinfection requirements stated in the regulations. The regulations do allow consideration of alternative methods for meeting disinfection requirements but the burden of proof is on the purveyor. The City is currently complying with interim measures developed by State authorities when irrigating the park and school areas.

25. Inspection of data obtained from the U.S. Geological Survey on wells in the Willits area indicates that the likelihood of drilling a well capable of supplying 200 gallons of water per minute and free from boron and other deleterious constituents is not high. A detailed hydrogeologic survey and extensive test drilling work would be needed to establish feasibility. The cost for such work could be as high as $25,000 and would not guarantee a producing well. Construction of the well with all necessary improvements and piping could run an additional $50,000 to $75,000.

26. Groundwater recharge of plant effluent and repumping from shallow wells adjacent to the recharge area is possible but the cost for constructing and operating such facilities may be higher than that incurred by providing filtration or screening. Also, there is no assurance that the effluent quality would measure up to that produced by direct filtration of effluent.

27. Conceptual designs for three filtration schemes and for one microstraining arrangement were developed and costed out. The four designs all require a high-quality, low turbidity secondary wastewater such as that now produced at the plant in order to function effectively. The recommended alternative, which employs two pressure filters and separate pumping and piping for filtered irrigation water, will cost approximately $220,000.

28. The recommended overall project is a composite of the various schemes proposed for solving the individual problems at the plant. The only element for which a positive recommendation cannot be made at this time is sludge processing because the feasibility of, and rel-

ative costs for, the Kleensmoke and belt filter press alternatives have not yet been determined. Costs for the wet weather lagoon systems have been reduced by $230,000 over those shown in the draft report to account for the deletion of aeration equipment (i.e., subject to installation at some future date as required). Those items comprising the recommended plan and the estimated project cost for each are as follows:

| | |
|---|---|
| Lagoon system | $584,000 |
| Chlorine Contact Chamber | $ 90,000 |
| Sludge processing | $ 33,00 to $410,000 |
| Standby generator | $125,000 |
| Stormwater pumps | $ 50,000 |
| Pressure filtration system | $220,000 |
| RANGE FOR TOTAL PROJECT COSTS | $1,102,000 to $1,479,000 |

## Recommendations

It is recommended that:

1. The City of Willits and the Brooktrails Community Services District formally adopt the final Phase II report as the 20-year plan of action for expanding and improving the Willits Wastewater Treatment Plant. This report includes all City, District, North Coast Regional Water Quality Control Board and State Department of Health Services requirements, recommendations and comments.

2. A prioritized improvement program be developed and approved so that funds, if limited, can be directed to solving the most critical problems first. A preliminary priority ranking, based on the comments of all parties involved, is:

   First Priority

   a. Sludge processing.

   b. Filtration system for park and playfield irrigation.

   Second Priority

   a. Wet weather treatment lagoon - without aerators but

including diking of main plant area and Ponds 1, 2, and 3 and construction of a chlorine contact tank.

b. Standby generator

Third Priority

a. Aerators and electrical support equipment for lagoons.

b. Storm water pumps.

c. Additional diking for Ponds 4 and 5.

3. A full-scale operational test of the Kleensmoke process with either or both sludge concentration schemes (i.e., the mesh tube filter and/or the sludge filter bag) be undertaken. The belt filter press equipment should also be field-tested. The City would undertake this test with the assistance of Barrett, Harris & Associates, Inc. (BHA). BHA would analyze the data and develop revised costs for sludge processing. BHA would also prepare a short report summarizing all testing work that recommends one sludge processing scheme.

4. Financing options be investigated by Barrett, Harris & Associates, Inc. in association with Rauscher, Pierce, Refsnes, Inc., a firm specializing in public finance. Conventional and unconventional self-financing options would be considered as well as State and Federal grants and loans. A short report summarizing the financing options currently available to the City and District and the costs for implementing an improvement project at various cost levels would be prepared.

# TREATMENT ALTERNATIVES

## General

A major objective of the Phase II predesign report is to identify the most economical and dependable means for treating an average dry weather flow of 1.75 mgd and a peak wet weather flow of 4.8 mgd. This would provide the City and the Brooktrails Community Services District with a minimum of fifteen to twenty years capacity for growth under current economic conditions. Sludge processing must be upgraded and made more reliable and flexible to achieve this objective. This subject is discussed in detail in Chapter IV. Reliability under peak wet weather flow conditions also requires that flood control, emergency power and pumping improvements be made as was outlined in the Phase I report. Flood protection is discussed further in Chapter V of this report.

## Average Dry Weather Flow Projections

Based on current economic trends, past estimates of growth now appear high. While a reversal does not appear imminent, it is entirely possible that growth at past rates could reoccur in the future. For this reason, a table has been prepared showing the effects of various rates of growth applied to the true average dry weather flow now occuring at the plant (i.e., excluding all residual groundwater infiltration due to rainy years). These projections are shown on Table 1. The base average dry weather flow values used for the projections are 0.40 and 0.15 mgd, respectively, for the City of Willits and Brooktrails CSD.

The table shows that at a six percent growth rate a 1.75 mgd average dry weather flow (ADWF) capacity will be adequate to at least the year 2000, and that 1.0 mgd of ADWF capacity, backed up with adequate sludge treatment and disposal capability, will suffice for eight to ten years.

## Peak Wet Weather Flow Requirements

A detailed analysis of treatment plant and holding pond capacity required to permit continuous operation of the plant under a 100 year frequency storm (i.e., assumed to be the December, 1964, event) was performed as part of the Phase I work. The conclusion was reached that with 4.8 mgd of treatment capacity, 12 to 19 mg of holding pond storage would be required to prevent discharge of untreated sewage to the creek.

During the 1979-80 water year (i.e., October, 1979, through September, 1980), which was a more-or-less average year for rainfall, 18 mg of holding pond storage was adequate with only 2.4 mgd of treatment capacity. If the existing plant had

TABLE 1

AVERAGE DRY WEATHER FLOW PROJECTIONS
SENSITIVITY ANALYSIS

| Annual Percentage Increase | 1990 Willits | 1990 BCSD | 1990 Total | 2000 Willits | 2000 BCSD | 2000 Total |
|---|---|---|---|---|---|---|
| 0(1) | 0.40 | 0.15 | 0.55 | 0.40 | 0.15 | 0.55 |
| 2 | 0.46 | 0.18 | 0.64 | 0.57 | 0.22 | 0.79 |
| 4 | 0.55 | 0.20 | 0.75 | 0.81 | 0.30 | 1.11 |
| 6 | 0.64 | 0.24 | 0.88 | 1.14 | 0.43 | 1.57 |
| 8 | 0.74 | 0.28 | 1.02 | 1.60 | 0.60 | 2.20 |
| 10 | 0.86 | 0.32 | 1.18 | 2.22 | 0.83 | 3.05 |

(1) Based on following 1982 ADWF data:

| | |
|---|---|
| Willits | 0.40 mgd |
| Brooktrails CSD | 0.15 |
| Total | 0.55 mgd |

operated at 3.0 mgd as it will be able to do after Phase I improvements are complete, 8 mg of holding pond capacity would have sufficed. A design cannot, however, be based on average conditions.

The foregoing events translated into a design concept means that an additional 1.8 mgd of plant capacity must be added to the existing 3.0 mgd available from the existing plant. The concept also implies that holding pond dikes must be raised sufficiently to prevent flooding during the 100 year storm. The dikes must be raised approximately 4.5 feet.

While peak flows in the Willits-Brooktrails system are high, their frequency of occurence, at least in average years, is not great. An analysis made of flow data from water year 1979-80 is shown on Table 2. The table shows that the average monthly flow, expressed in mgd, never exceeded the capacity of the plant. During the year daily inflow to the plant exceeded 3.0 mgd and 2.5 mgd, only 14 and 24 days, respectively. During the December, 1964, flood, in contrast, records indicate seven consecutive days

TABLE 2

PLANT INFLOW DATA 1979-80

| Month | Average Flow in mgd | 5.0 | 4.0 | 3.0 | 2.5 | 2.0 | 1.5 | 1.0 | Totals |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Number of Days During Which Flow Shown, in mgd, Was Exceeded | | | | | |
| Oct, 1979 | 0.948 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov | 1.597 | 0 | 0 | 1 | 1 | 9 | 4 | 8 | 23 |
| Dec | 1.195 | 0 | 0 | 2 | 1 | 4 | 4 | 7 | 18 |
| Jan, 1980 | 2.053 | 0 | 2 | 0 | 3 | 8 | 13 | 5 | 31 |
| Feb | 2.289 | 1 | 3 | 4 | 3 | 2 | 1 | 14 | 28 |
| Mar | 1.614 | 0 | 0 | 1 | 2 | 4 | 9 | 12 | 28 |
| Apr | 1.133 | 0 | 0 | 0 | 0 | 1 | 4 | 9 | 14 |
| May | 0.644 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| June | 0.553 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| July | 0.504 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aug | 0.469 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sept | 0.484 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Avg/Total | 1.116 | 1 | 5 | 8 | 10 | 30 | 36 | 62 | 152 |
| Cumulative Total | | 1 | 6 | 14 | 24 | 54 | 90 | 152 | |
| Cumulative Percent | | 0.3 | 1.6 | 3.8 | 6.6 | 14.8 | 24.7 | 41.6 | |

seven consecutive days in excess of 5.0 mgd, with four consecutive days of 7.0 mgd average inflow or greater.

Treatment facilities built to handle flows in excess of 3.0 mgd will generally not need to operate more than five to ten percent of the time. The peak wet weather flow component of plant capacity is, therefore, expensive on a "per unit of flow treated" basis. Anything that can be done to minimize capital costs without jeopardizing the useful life of these facilities should be explored. Also, operating costs, except as they impact power demand are not nearly as significant as for the main plant inasmuch as these facilities only operate a few days per year.

## Conventional Secondary Treatment Alternatives

While it was believed initially that utilization of the existing pond system, in one form or another, would prove to be most economical for providing the needed 1.8 mgd of wet weather capacity, several conventional systems were investigated and costed out to establish a cost base for reference. All of these systems would require acquisition of property to the west or north of the existing plant site to accommodate process units and piping. With the exception of sludge treatment and handling facilities, the outfall and the operations building, all facilities and

piping would be new. The end result would be two parallel but separate treatment plants.

Costs were developed for an oxidation ditch plant (i.e., similar process-wise to the existing plant but of a different physical configuration) and for two fixed film processes, namely trickling filters and rotating biological contactors. The latter two plants require primary sedimentation ahead of these essentially secondary processes and are often employed with anaerobic digestion although there is no functional reason why aerobic digestion cannot be utilized. All three processes are capable of producing effluent meeting the Willits discharge requirements under summertime, as well as wintertime, waste loadings.

Table 3 shows estimated project costs for the three aforementioned alternatives. While the oxidation ditch system is slightly less expensive, costs for both the rotating biological contactor plant and trickling filter plant would bear closer scrutiny if these alternatives were to be considered seriously. The capital costs of these alternatives which are in the $2.1 to $2.5 million range are not cost-effective, however, compared to utilization of the existing holding ponds. Nevertheless, use of the two fixed film systems should be reconsidered if and when the average dry weather flow at the Willits plant approaches the 1.75 mgd limit because energy costs for operating either of these systems are one-third to one-fourth that for operating mechanically aerated systems such as the existing plant or an oxidation ditch.

## Pond-Based Alternatives

It was believed initally and confirmed by detailed investigation that the concept of converting some or all of the existing ponds (i.e., holding basins) to aerated lagoons would prove to be both technically feasible and highly economical. Two schemes were investigated in detail. The first entails utilizing existing Ponds 1 and 2 as completely mixed aeration basins with Ponds 4 and 5 functioning as partially mixed cells to permit settling of solids. A conventional concrete chlorine contact tank was included as part of the design. A total aerator capacity of 140 horsepower would be required under this scheme. The estimated capital cost for such a project would be approximately $1,030,000.

The second aerated lagoon scheme investigated in detail involves applying a high-efficiency, low energy concept for aerated lagoons developed by Dr. Linvil Rich of Clemson University. These concepts have been proven in practice during the last 5 to 6 years and represent something of a breakthrough in economies of operation and construction and also in effluent quality potential for lagoons.

TABLE 3

COSTS FOR CONVENTIONAL TREATMENT ALTERNATIVES

| Item | Cost |
|---|---|
| **Oxidation Ditch System** | |
| Ditch basin and structures | $395,000 |
| Aeration equipment | 363,000 |
| Sedimentation basin | 292,000 |
| Sludge pumping | 190,000 |
| Recycle pumping | 126,000 |
| Chlorination | 104,000 |
| Miscellaneous piping and equipment | 147,000 |
| Total Construction Cost | $1,617,000 |
| Contingencies, Engineering & Administration | 485,000 |
| TOTAL PROJECT COST | $2,102,000 |
| **Trickling Filter System** | |
| Primary treatment | $576,000 |
| Trickling filter | 297,000 |
| Secondary sedimentation basin | 292,000 |
| Sludge pumping - primary and secondary | 292,000 |
| Recycle pumping | 182,000 |
| Chlorination | 104,000 |
| Miscellaneous piping and equipment | 174,000 |
| Total Construction Cost | $1,917,000 |
| Contingencies, Engineering & Administration | 575,000 |
| TOTAL PROJECT COST | $2,492,000 |
| **Rotating Biological Contactor System** | |
| Primary treatment | $576,000 |
| RBC system | 205,000 |
| Secondary sedimentation basin | 292,000 |
| Sludge pumping - primary and secondary | 316,000 |
| Chlorination | 104,000 |
| Miscellaneous piping and equipment | 149,000 |
| Total Construction Cost | $1,642,000 |
| Contingencies, Engineering & Administration | 493,000 |
| TOTAL PROJECT COST | $2,135,000 |

Notes:
1) Cost basis is the fall of 1983.
2) Costs do not include sludge treatment and disposal costs.
3 Plant capacity is 1.8 mgd in all cases.

A key element of the Rich lagoon design philosophy is multiple cells - preferably one completely mixed cell followed by three partially mixed cells in which the hydraulic residence time per cell is maintained at approximately one day. The short retention time in the partially mixed cells will inhibit algal growth - the normal problem encountered with aerated lagoons in meeting discharge standards for both suspended solids and BOD.

Implementation of this scheme requires moderately deep lagoons on the order of 10 to 12 feet. Obviously, the existing ponds at Willits do not meet this requirement as they range in depth from 6 to 7 feet. If, however, the recommendations of the Phase I study for flood protection are followed, and the dikes are raised 4-1/2 feet for that purpose, the lagoon depth requirement can be met. An added benefit of raising the dikes is that lagoon volume is more than doubled. Table 4 gives physical data for all the ponds and basins at the Willits plant including the aeration basins. The data shown in the table includes dimensions, surface area in feet and the existing volume in million gallons for each pond individually and for various combinations of ponds. Also shown is the volume achievable with a 4-1/2 foot increase in dike height assuming that such an extension is vertical and that 1-1/2 feet of freeboard is provided.

The results of computations showing aerated lagoon cell hydraulic retention times and volumes under various plant flow rates are summarized on Table 5. These volumes would apply to either a dilute winter storm flow or to a full-strength dry weather waste. Horsepower requirements would, however, increase substantially in the first cell with the introduction of full-strength waste. Sludge deposition would also be proportionately greater operating with a full-strength waste. For operation at a 1.8 mgd flow rate, approximately 10 mg of total volume will be required. Approximately 40 percent of this total volume is needed for the initial complete-mix cell where the bulk of the treatment is accomplished. Three equally sized partially mixed cells follow in which treatment is completed and solids settle out. A small unmixed polishing cell functioning as a clarifier is usually provided following the treatment cells to ensure that discharge requirements are met. It is critical that retention time in the polishing cell be less than one-half day to prevent algal growth.

Perusal of Tables 4 and 5 show that the lagoon volume requirement for flow at a 1.8 mgd rate can be met utilizing the extended volume of Ponds 1, 2 and 3 used sequentially. A preliminary layout is shown on Figure 1. Under this scheme, Pond 1 becomes Cell A of the aerated lagoon system and is equipped with eight, 5 horsepower aspirating propeller-type aerators. This type of aerator has the advantage of relatively high mixing capability per horsepower inasmuch as horizontal circulation is imparted to the liquid in the basin. This is particularly important with a dilute waste such as storm flow where oxygen requirements are a

TABLE 4

POND PHYSICAL DATA

| Pond No. | Dimensions at Top of Dike Ft X Ft | Surface Area $Ft^2$ | Existing Volume (mg) | Extended Volume (mg) |
|---|---|---|---|---|
| 1a | 120' x 116' | 13,900 | 0.50 | 1.12 |
| 1b | 280' x 116' | 32,500 | 1.22 | 2.68 |
| 2 | 415' x 120' | 49,800 | 1.80 | 4.04 |
| 3 | 340' x 116' | 39,400 | 1.49 | 3.26 |
| 4 | 780' x 150' | 117,000 | 5.27 | 10.52 |
| 5 | 490' x 300' | 147,000 | 6.62 | 13.22 |
| AB1(1) | 147' x 103' | 14,800 | 0.72 | - |
| AB2(1) | 147' x 103' | 14,800 | 0.72 | - |
| 1a+1b | | 46,400 | 1.72 | 3.80 |
| 1+2 | | 96,200 | 3.52 | 7.84 |
| 1+2+3 | | 135,600 | 5.01 | 11.10 |
| 1+2+3+4 | | 252,600 | 10.28 | 21.62 |
| 1+2+3+4+5 | | 399,600 | 16.90 | 34.84 |
| AB1 + AB2 | | 29,600 | 1.44 | - |

(1) AB - Aeration Basins

TABLE 5

AERATED LAGOON SYSTEM
CELL VOLUME REQUIREMENTS

| Cell | Design Hydraulic Retention Time (days) | Cell Volume Required in mg At the Flow Rate Shown | | | |
|---|---|---|---|---|---|
| | | 0.64 mgd | 1.00 mgd | 1.75 mgd | 2.00 mgd |
| A(1) | 2.15 | 1.38 | 2.15 | 3.76 | 4.30 |
| B(2) | 1.00 | 0.64 | 1.00 | 1.75 | 2.00 |
| C(2) | 1.00 | 0.64 | 1.00 | 1.75 | 2.00 |
| D(2) | 1.00 | 0.64 | 1.00 | 1.75 | 2.00 |
| E(3) | 0.50 | 0.32 | 0.50 | 0.88 | 1.00 |
| Totals | 5.65 | 3.62 | 5.65 | 9.89 | 11.30 |

(1) Completely mixed pond
(2) Partially mixed pond
(3) Polishing (unmixed) pond

fraction of mixing requirements. Thus a complete-mix regime can be achieved in Cell A using this type of aerator at a power level of 10 horsepower per mg of capacity or 40 total horsepower for the cell. If full strength waste were treated in this cell, however, an additional 60 horsepower of aeration capacity would be required to meet oxygen requirements. This would still be an efficient solution compared to other aeration methods.

Existing Pond 2 has been divided into two equal, 2 mg cells, each equipped with five, 2 horsepower aerators. This more than meets the projected oxygen requirements for these ponds. It is likely that one or more of these aerators can be turned off under many operating conditions. The pond is divided utilizing a flexible Hypalon partition which is anchored to the pond dikes. The curtain is supported by a floating boom and held in place at the bottom by a weighted cable. The curtains will be equipped with openings to direct flow between cells. They can also be moved if necessary to accommodate changes in operating schemes or different flow conditions.

Pond 3 has been subdivided into 1) Cell D, the final partially mixed pond, 2) Cell E, the polishing pond and 3) the chlorine contact cell. Cell D is, like Cells B and C, equipped with five, 2 horsepower aerators. The polishing cell is divided longitudinally with a flexible partition to increase the length-to-width ratio. The chlorine contact chamber has been created from a wedged segment at the end of the pond utilizing a short partition.

Level control in the ponds and pacing of chlorine equipment would be accomplished by means of a Cipoletti weir and float actuated transmitter mounted in a cut-in manhole structure on the existing outfall pipe. The treated effluent from the existing plant and aerated lagoon system would be brought together at this point. Provision for pumping under storm flow conditions when water level in Haehl Creek exceeds 1,342 feet would be provided. Under this scheme, the manhole would serve as a sump for low head, propeller-type pumps that would discharge to the outfall below the manhole. The outfall would be gated at the manhole to permit pumping as well as gravity operation.

A comminutor with bypass bar screen should be provided adjacent to the influent structure. Minor revisions to the overflow piping would also be required. Flows in excess of 4.8 mgd must be diverted to Holding Basin No. 4 and 5 which would still function in this capacity under the revised scheme. Excess flows would be returned from these ponds for treatment such as is done at present. Note that the horsepower requirement for operation under a 1.8 mgd storm flow mode of operation is 70 which is half of the 140 Hp needed for the conventional aerated lagoon scheme previously described.

Estimated capital costs to construct the aerated lagoon system shown on Figure 1 is $814,000. A breakdown is shown on Table 6.

TABLE 6

COSTS FOR AERATED LAGOON SYSTEM

| Item | Cost |
|---|---|
| Dikes and Retaining Walls | $361,400 |
| Site Piping and Transfer Structures | 28,000 |
| Pond Partitions | 19,200 |
| Aerators (8 @ 5 Hp and 15 @ 2 Hp) | 111,500 |
| Headworks including Comminutor | 15,000 |
| Cut-in Outfall Manhole with Piping and Metering | 15,000 |
| Chlorination System Modifications | 10,000 |
| Electrical Work | 66,000 |
| Total Construction Cost | $626,100 |
| Contingencies, Engineering and Administration | 187,900 |
| TOTAL PROJECT COST | $814,000 |

Notes: 1) Cost basis is the fall of 1983.
2) Costs do not include sludge treatment and disposal costs.
3 Plant capacity is 1.8 mgd.

Note that approximately $250,000 of the capital cost for this scheme (i.e., for dikes) would be required to flood-proof the plant. The dikes thus serve a dual function.

A possibility worth exploring during detailed design is use of standby generator equipment to power lagoon aeration equipment. This would serve two functions, namely, (1) to periodically exercise the generator which is necessary to keep it in proper operating condition anyway and (2) to minimize demand charges for electrical energy accruing under P.G.& E.'s rate schedule.

Once in place, the possibility of using the aerated lagoon system on a year-around basis should be explored because it may prove more economical to operate than the current plant. A full scale test can be readily performed under the present dry weather flow conditions if minor piping and partitioning provisions are incorporated into the design of the stormwater treatment system. Inasmuch as Cell A is much too large to function as the lead cell at a flow of 0.6 to 0.7 mgd, the existing aeration basins should be used for this purpose. One 20 horsepower aerator in each basin would suffice for mixing and oxygen transfer. Instead of recycling sludge, the basins would be used on a "once-through" basis as aerated lagoons. The effluent would be diverted to Cell D which would be partitioned into three subcells each of approximately 0.75 mgd capacity - the proper size to meet the hydraulic

retention time requirements at that flow. The existing polishing cell could be used partly for that purpose and also for short-term storage of irrigation water. Operating in this manner for a summer season would provide data for determining whether or not this mode is cheaper and more convenient to operate than the existing arrangement. All that would be required to perform this testing work would be two additional partitions and some piping. The cost of providing this flexibility would be approximately $20,000.

North Coast Regional Water Quality Control Board Comments

Following review and discussion of this concept, the NCRWQCB suggested that the scheme first be implemented without aerators (see Appendix B). They believe that low ambient water temperatures may suppress biological activity to a degree not requiring mechanical aeration. Barrett, Harris & Associates, Inc. is not fully convinced the process will work under all conditions without aeration but concurs that it is worthwhile to implement this scheme without aerators on a trial basis as long as this approach is satisfactory to the NCRWQCB. If problems arise, aerators and the required appurtenant wiring and controls can be added. Eliminating, or deferring the aerators and electrical work will reduce project costs approximately $230,000.

Barrett, Harris & Associates, Inc. concurs with the NCRWQCB preference for a conventional concrete chlorine contact tank (i.e., similar to that existing at the plant) rather than a diked-off pond compartment to serve this purpose. Such a structure can be constructed at the north end of Pond 3. The cost of such a structure designed for a flow of 1.8 mgd is estimated to be $90,000.

SEWER REVENUE SOURCES

WASTEWATER CAPITAL IMPROVEMENT FUND

BUDGET

1983 - 1984

| | | |
|---|---|---|
| Estimated Fund balance 7/1/83 | | $ 8,578 |
| Estimated Revenue | $ 5,000 | |
| Estimated Expenditures | $ (13,274) | |
| Interfund Transfers | $ 85,000 Sewer Hookups | |
| | 6,000 from WWCR | |
| Estimated Fund balance as of 6/30/84 | | $ 91,304 |

# OUTSTANDING SEWER BONDS

## BOND INTEREST & REDEMPTION FUND

## BUDGET

## 1983 - 1984

| | | |
|---|---|---|
| Estimated Fund balance 7/1/83 | | $ 36,646 |
| Estimated Revenue | $ 30,000 | |
| Estimated Expenditures | $ (34,756) | |
| Interfund Transfers | $ | |
| Estimated Fund balance as of 6/30/84 | | $ 31,890 |

# IX. OTHER URBAN SERVICES

CONTENTS

WILLITS UNIFIED SCHOOL DISTRICT

Enrollment

| | 9/16/80 | 9/02/81 | 9/09/82 | 8/30/83 |
|---|---|---|---|---|
| Brookside Elementary | | | | |
| Kindergarten | 158 | 144 | 170 | 150 |
| First | 159 | 172 | 168 | 161 |
| Second | 127 | 153 | 162 | 158 |
| Third | 155 | 128 | 153 | 166 |
| Fourth | 59 | 104 | 110 | 95 |
| Special Education | 10 | - | - | - |
| | 668 | 701 | 763 | 730 |
| Baechtel Grove | | | | |
| Fourth | 90 | 64 | 24 | 50 |
| Fifth | 145 | 152 | 154 | 131 |
| Sixth | 160 | 145 | 150 | 158 |
| Seventh | 136 | 163 | 158 | 145 |
| Special Education | 5 | 10 | 18 | 22 |
| | 536 | 534 | 504 | 506 |
| San Hedrin High | 82 | 66 | 56 | 51 |
| Willits High School | | | | |
| Eighth | 131 | 135 | 166 | 158 |
| Ninth | 143 | 126 | 146 | 154 |
| Tenth | 125 | 130 | 126 | 135 |
| Eleventh | 128 | 119 | 122 | 108 |
| Twelfth | 104 | 112 | 105 | 109 |
| | 631 | 622 | 665 | 664 |
| | 1,917 | 1,923 | 1,988 | 1,951 |

WILLITS UNIFIED SCHOOL DISTRICT

ENROLLMENT PROJECTIONS
1982-1986

| Grade | Actual Enrollment Fall, 1981 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 |
|---|---|---|---|---|---|---|
| K | 154 | 159 | 164 | 169 | 174 | 174 |
| 1 | 174 | 162 | 167 | 172 | 177 | 182 |
| 2 | 164 | 166 | 154 | 159 | 164 | 169 |
| 3 | 134 | 182 | 184 | 172 | 177 | 184 |
| 4 | 171 | 133 | 181 | 183 | 171 | 176 |
| 5 | 156 | 172 | 134 | 182 | 184 | 172 |
| 6 | 153 | 165 | 184 | 146 | 194 | 196 |
| 7 | 170 | 154 | 166 | 185 | 147 | 195 |
| Totals | 1276 | 1293 | 1334 | 1368 | 1388 | 1453 |
| | Increase: | +17 or +1.33% | +41 or +4.55% | +34 or +2.55% | +20 or +1.46% | +65 or +4.68% |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 135 | 165 | 149 | 161 | 180 | 142 |
| 9 | 130 | 146 | 176 | 160 | 172 | 191 |
| 10 | 130 | 110 | 126 | 156 | 140 | 152 |
| 11 | 121 | 149 | 129 | 145 | 175 | 159 |
| 12 | 110 | 95 | 123 | 103 | 119 | 149 |
| Totals | 626 | 665 | 703 | 725 | 786 | 793 |
| | Increase: | +39 or +6.23% | +38 or +5.71% | +22 or +3.13% | +61 or +8.41% | + 7 or +0.89% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Totals K-12 | 1902 | 1958 | 2037 | 2093 | 2174 | 2246 |
| | Increase: | +56 or +2.94% | +79 or +4.03% | +56 or +2.75% | +81 or +3.87% | +72 or +3.31% |

| Grade Level | Projected Enrollment Square Feet Allowance | | Square Feet Needed |
|---|---|---|---|
| K-6 | 1258 X 55 | = | 69,190 |
| 7-8 | 337 X 75 | = | 25,275 |
| 9-12 | 651 X (26,100 plus 99 per student over 100) | = | 26,100 |
| | 551 X 99 | = | 54,549 |
| | | Total | 175,114 |
| | Current square footage | = | 145,723 |
| | Deficit | = | 29,391 |

Willits Unified School District Board Policy reflects a maximum class size size of 30 students in grades kindergarten - 3 and 24 students in grades 9 - 12. The projected required classrooms per grade level are as follows:

| Grade | Present No. Classrooms | 1986-1987 Projected Enrollment | Projected No. Required Classrooms | |
|---|---|---|---|---|
| K | 3 * | 179 | 6 * | (3) |
| 1 | | 182 | 6 | |
| 2 | | 169 | 6 | |
| 3 | 16 | 184 | 6 | 24 |
| 4 | | 176 | 6 | |
| 5 | | 172 | 6 | |
| 6 | 17 | 196 | 7 | 20 |
| 7 | | 195 | 7 | |
| 8 | | 142 | 5 | |
| 9 | | 191 | 8 | |
| 10 | 28 | 152 | 6 | 33 |
| 11 | | 159 | 7 | |
| 12 | | 149 | 6 | |
| | 64 | | | 80 |

( * K = frequently half-day programs thus 3 classrooms are adequate.)

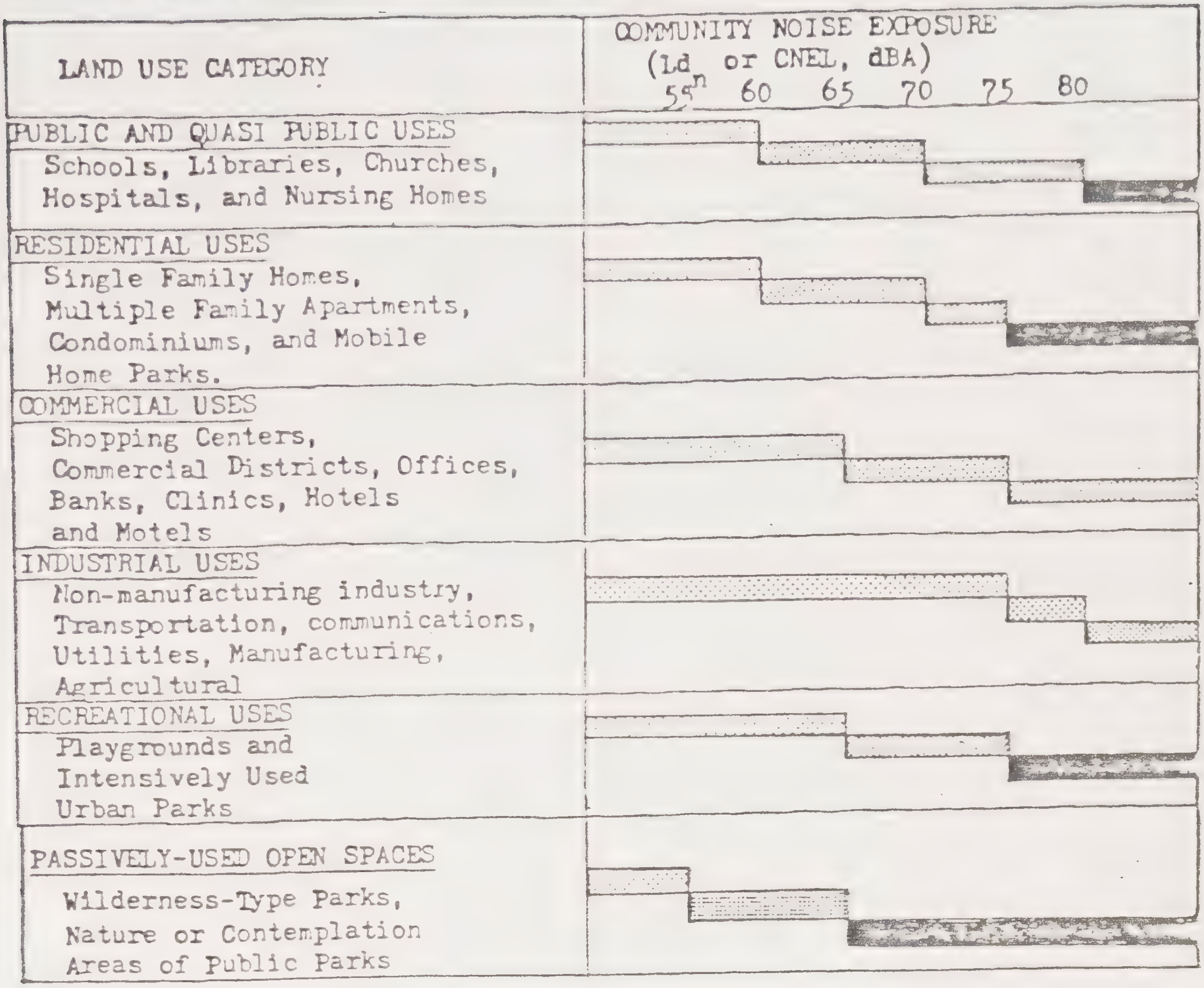
# X. NOISE

CONTENTS | PAGE

## TYPICAL SOUND LEVELS FOR COMMON NOISE SOURCES IN DBA

| Overall Quality | dBA | Outdoor | Indoor |
|---|---|---|---|
| Uncomfortably loud | 130 | 50-horsepower siren at 100 feet | - |
| | 120 | Jet take-off at 200 feet | - |
| | 110 | - | Rock-n-roll band |
| Very loud | 100 | Jet flyover at 1000 feet, power mower | Newspaper press |
| | 90 | Motorcycle at 25 feet | Food blender |
| Moderately loud | 80 | High urban ambient sound; passenger car, 65 miles per hour at 25 feet | Garbage disposal, clothes washer |
| | 70 | - | TV audio, vacuum cleaner |
| | 60 | Air conditioner at 20 feet | Electric typewriter, conversation |
| Quiet | 50 | Light traffic at 100 feet | Average residence |
| | 40 | Bird calls, lower limit urban ambient sound | - |
| Very quiet | 30 | - | Soft whisper |
| Just audible | 20 | - | Television studio, leaves rustling |
| | 10 | - | - |
| Threshold of hearing | 0 | - | - |

## LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

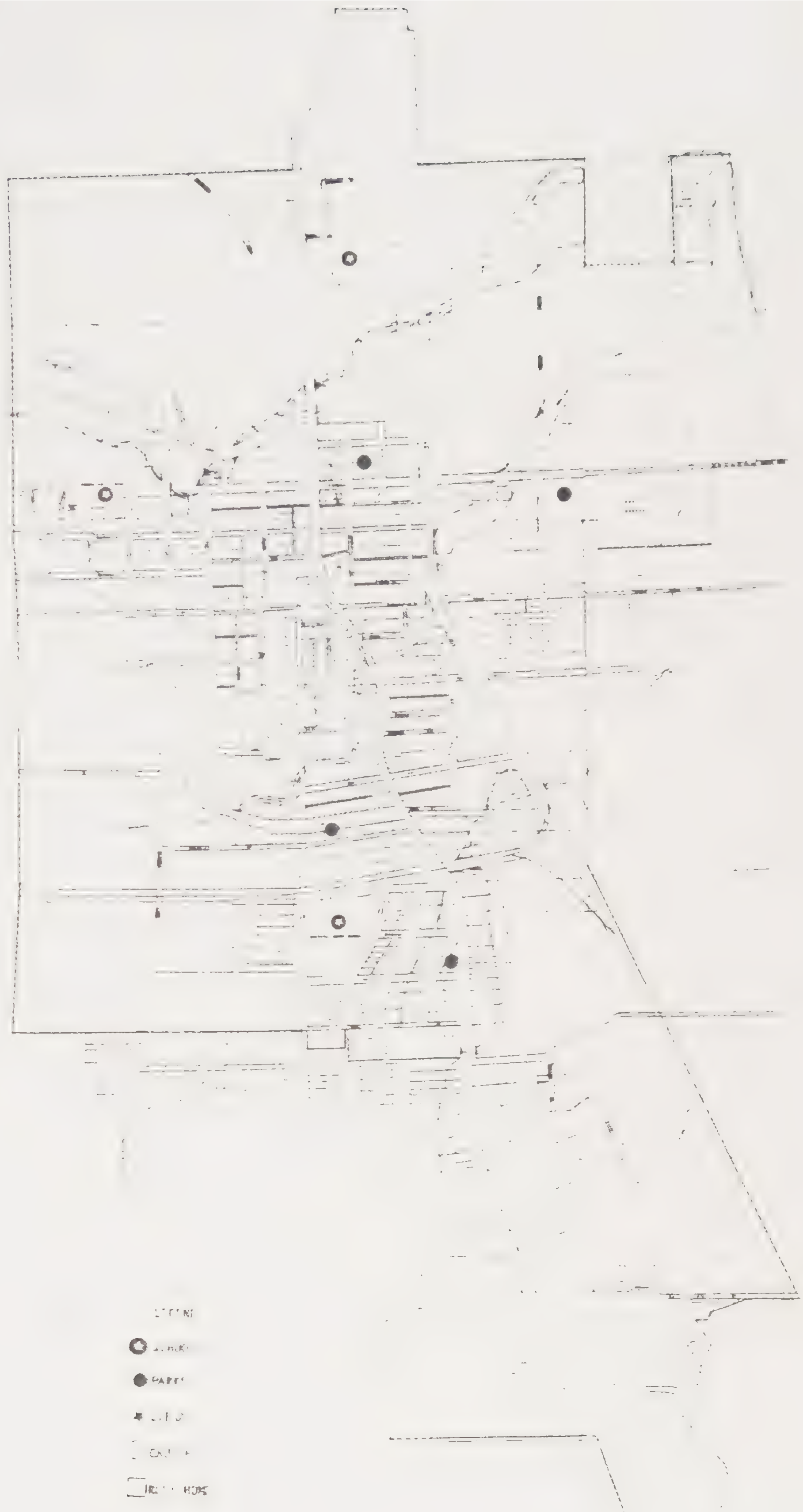



| Legend. | Interpretation |
|---|---|
| Normally Acceptable | Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. |
| Conditionally Acceptable | New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. |
| Normally Unacceptable | New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. |
| Clearly Unacceptable | New construction or development should generally not be undertaken. |

TABLE 3. SOUND LEVEL REDUCTION DUE TO BUILDING TYPE AND WINDOW CONDITION

| Building Type | Window Condition | Reduction of Noise from Outside Sources |
|---|---|---|
| All | Open | 10 dB |
| Light Frame | Ordinary, sash closed | 20 dB |
| Masonry | Single pane, closed | 25 dB |
| Masonry | Double pane, closed | 35 dB |

source: Federal Highway Administration



MENDOCINO COUNTY, CALIFORNIA

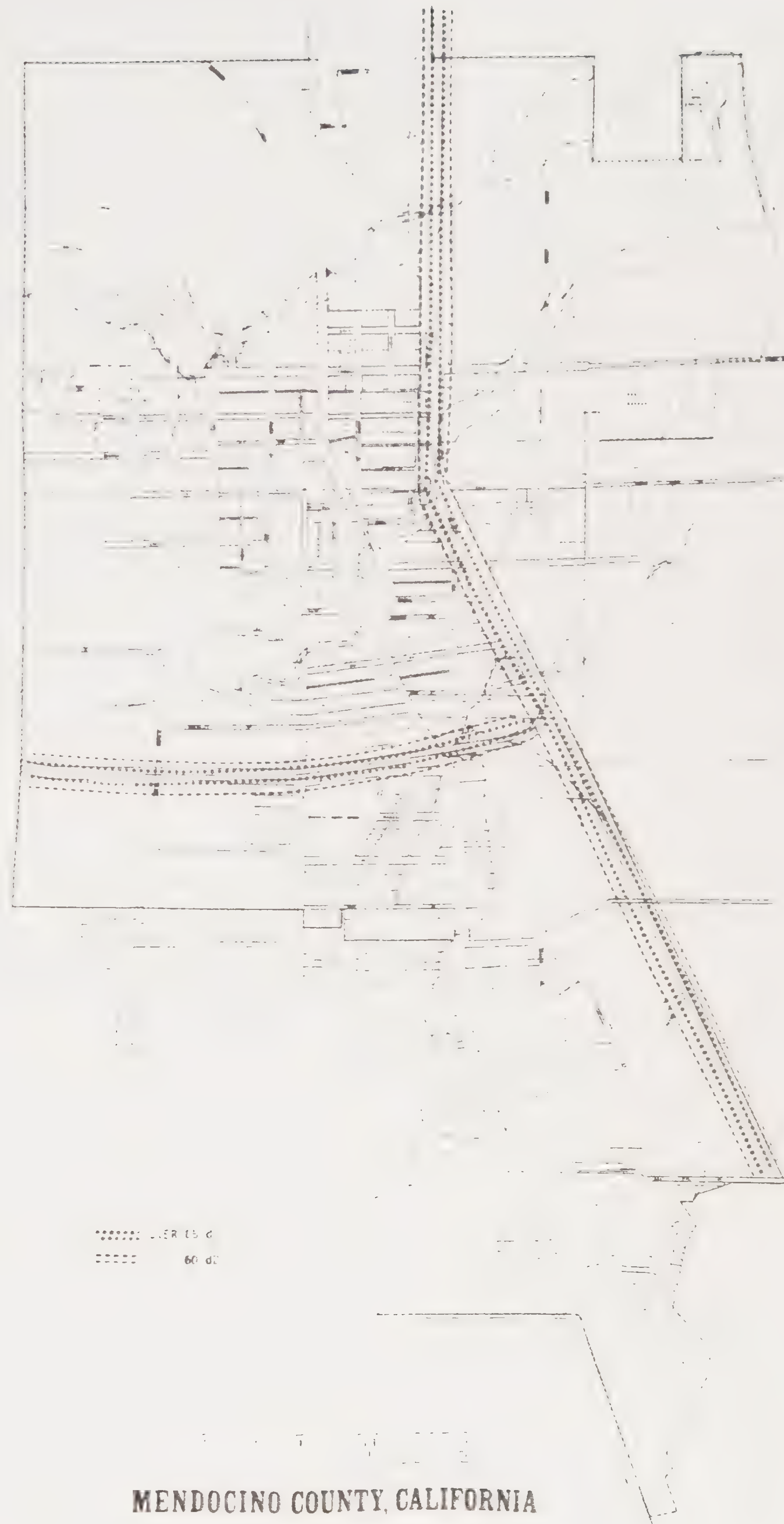
NOISE SENSITIVE RECEPTORS IN WILLITS

MENDOCINO COUNTY, CALIFORNIA

EXISTING [illegible] VEHICLES Ldn NOISE CONTOURS

MAJOR [illegible] IN WILLITS

X-4




MENDOCINO COUNTY, CALIFORNIA

ENVIRONS Ldn NOISE CONTOURS IN WILLIT

EXISTING NOISE EXPOSURE

CITY OF WILLITS - JUNE, 22, 1983
NOISE DATA SHEET - EXTERIOR READINGS

1. Site A - Location: Hwy 101 @ Baechtel Road (South) Highway Condition: @ Grade

| Mon. Distance From Source | dB Low | dB Med. | dB High | dB Peak (H. Trucks) | dB Ambient |
|---|---|---|---|---|---|
| 20' | 55 | 72 | 84 | 87 | 55 |
| 100' | 54 | 67 | 80 | 83 | 53 |
| 200' | 52 | 57 | 68 | -- | 45 |

**NOTE:** Ldn = 64dB (100'); 59dB (200')

2. Site B - Location: Hwy 101 @ Howard Hospital Highway Condition: @ Grade and Depression

| | | | | | |
|---|---|---|---|---|---|
| 20' | 60 | 74 | 85 | 87 | 59 |
| 100' | 55 | 65 | 79 | 80 | 52 |
| 200' | 50 | 57 | 67 | 68 | 48 |

**NOTE:** Ldn = 54dB (100'); 59dB (200')

3. Site C - Location: Baechtel Grove School (Summer Schedule)

| | | | | | |
|---|---|---|---|---|---|
| 20' | 50 | 54 | 56 | -- | 47 |

**NOTE:** Typical Residential (S.F.) Street with light traffic, west of Highway 101 Ldn = 54dB (100')

4. Site D - Location: Harwood "A" Plant Gate @ Blosser/Franklin

| | | | | | |
|---|---|---|---|---|---|
| 20' | 72 | -- | -- | 90 | 69 |
| 100' | 63 | 66 | -- | 75 | 62 |
| 200' | 58 | 64 | -- | 75 (incl. lunch whistle) | 56 |

**NOTE:** Typical large mill in light/med. manufacturing area with stationary source and traffic
Ldn = 63dB (100')

5. Site E - Location: Hwy 101 @ E. Commercial

| | | | | | |
|---|---|---|---|---|---|
| 20' | 74 | 76 | 85 | 86 | 70 |
| 100' | 68 | 74 | -- | 86 | 72 |
| 300' (State/Humboldt) | 54 | 63 | 66 | -- | 52 |

**NOTE:** Ldn = 72dB (100')

6. Site F - Location: Hwy 101 @ Hwy 20

| | | | | | |
|---|---|---|---|---|---|
| 20' | 68 | 78 | 86 | 86 | 72 |
| 100' | 55 | 70 | -- | 82 | 64 |
| 200' | 56 | 62 | 66 | -- | 56 |

**NOTE:** Ldn = 64dB (100') 56dB (200')

7. Site G - Location: Hwy 101 @ Willits High School

| | | | | | |
|---|---|---|---|---|---|
| 20' | 56 | 73 | 86 | 90 | 56 |
| 100' | 57 | 60 | 65 | 77 | 54 |

**NOTE:** Ldn = 56dB (100') ; 54dB (200')

RECOMMENDED MAXIMUM ALLOWABLE NOISE LEVELS
FOR CONSTRUCTION EQUIPMENT

| Equipment | Peak Noise Level in dBA at 50 ft |
|---|---|
| Earthmoving | |
| front loader | 75 |
| backhoes | 75 |
| dozers | 75 |
| tractors | 75 |
| scrapers | 80 |
| graders | 75 |
| truck | 75 |
| paver | 80 |
| Materials Handling | |
| concrete mixer | 75 |
| concrete pump | 75 |
| crane | 75 |
| derrick | 75 |
| Stationary | |
| pumps | 75 |
| generators | 75 |
| compressors | 75 |
| Impact | |
| pile drivers | 95 |
| jackhammers | 75 |
| rock drills | 80 |
| pneumatic tools | 80 |
| Other | |
| saws | 75 |
| vibrator | 75 |

# XI. ENVIRONMENTAL HAZARDS

CONTENTS | PAGE

The major floods in Willits have resulted from extended periods of winter rainfall produced by storms from the Pacific Ocean.

The eastern section of Willits is subject to flooding from the streams flowing into Little Lake Valley from the west (Mill and Broaddus Creeks) and south (Haehl/Baechtel Creek). The extent of flooding has been documented by high-water-mark elevations taken by the U.S. Army Corps of Engineers.

The U.S. Army Corps of Engineers collected and tabulated high-water-mark elevations from the December 1964 flood on Baechtel, Broaddus, and Mill Creeks (References 6 and 7). The locations and elevations of some of these marks are presented below:

| Location | Elevation (Feet) |
|---|---|
| Baechtel Creek - 50 feet upstream of Railroad Avenue | 1368.82 |
| Baechtel Creek - 45 feet upstream of Main Street (U.S. Highway 101) | 1382.73 |
| Broaddus Creek - 200 feet downstream of Commercial Street | 1356.49 |
| Broaddus Creek - 75 feet upstream of Main Street (U.S. Highway 101) | 1370.61 |
| Mill Creek - 150 feet downstream of Southern Pacific Railroad bridge | 1358.99 |
| Mill Creek - 100 feet downstream of Main Street (U.S. Highway 101) | 1367.41 |

The most recent flooding occurred in January 1974; however, no gage data are available to estimate the recurrence interval.

The extent of flooding for major floods other than December 1964 (December 1955, January 1974, and others) has not been documented by published high-water marks; however, the December 1964 event was the largest flood of record on Eel River, to the east of Willits. Stream blockage by debris has been cited as a problem by city officials during past floods.

Table 1. Summary of Discharges

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (Cubic Feet per Second) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Haehl/Baechtel Creek | | | | | |
| At the Downstream Corporate Limits[1] | 33.6 | 3,520 | 7,940 | 9,240 | 12,600 |
| Above Broaddus Creek Low Flow Confluence[2] | 23.9 | 2,450 | 5,800 | 6,740 | 9,160 |
| Above Broaddus Creek 50-Year Flow Confluence[3] | 16.0 | 2,450 | 4,070 | 6,740 | 9,160 |
| Above Haehl Creek Low Flow Confluence[4] | 10.1 | 1,680 | 4,070 | 4,730 | 6,420 |
| Above Haehl Creek 500-Year Flow Confluence[5] | 9.9 | 1,680 | 2,790 | 3,250 | 4,410 |
| At the Upstream Limit of Study | 8.1 | 1,410 | 2,380 | 2,780 | 3,810 |
| Broaddus Creek | | | | | |
| Above the Confluence With Haehl/Baechtel Creek | 7.9 | 1,380 | 2,260 | 2,620 | 3,530 |
| Mill Creek | | | | | |
| At the Downstream Corporate Limits | 9.7 | 1,620 | 2,730 | 3,190 | 4,380 |

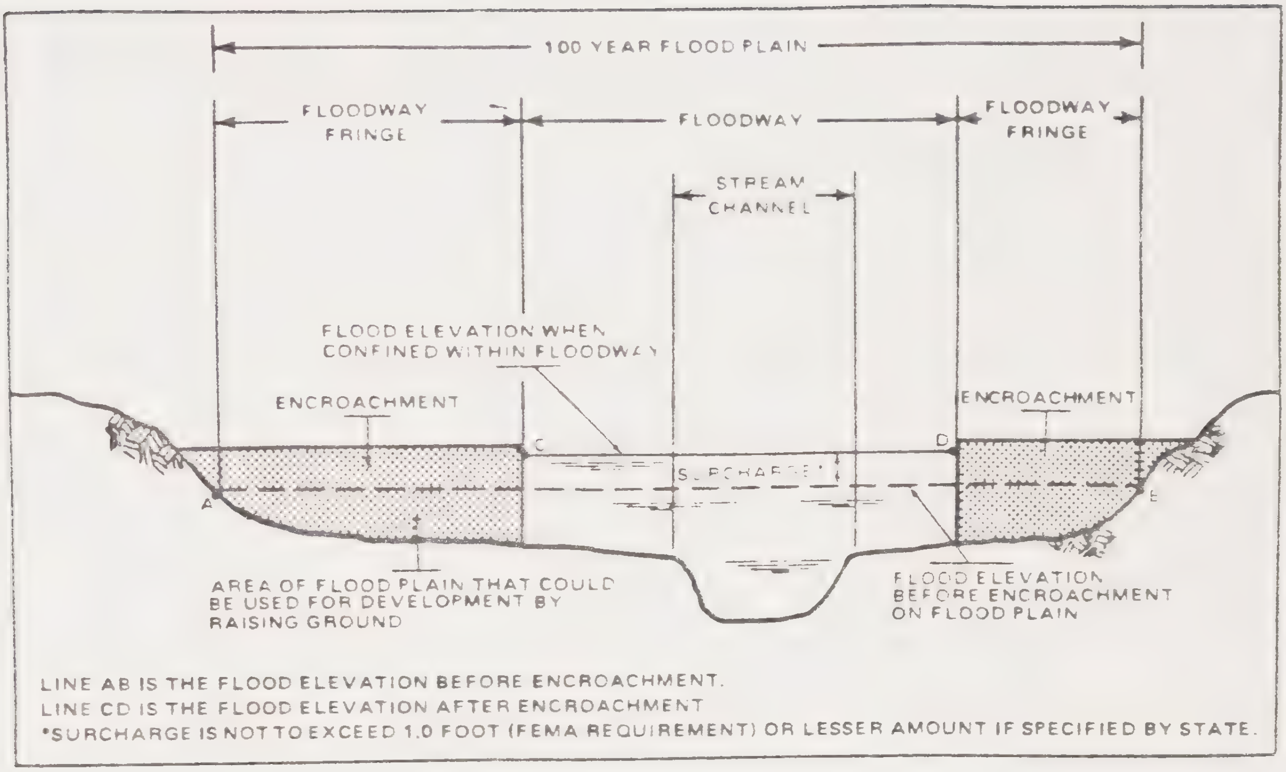
[1] Includes Mill Creek Drainage Area and Contributing Flows, Except for Mill Creek 10-Year Peak Discharge

[2] Includes Broaddus Creek Drainage Area and Contributing Flows, Except for Broaddus Creek 10-Year Peak Discharge

[3] 1750 Feet Upstream of Broaddus Creek Low Flow Confluence; Does Not Include Broaddus Creek 10-Year or 50-Year Peak Discharges

[4] Does Not Include Haehl Creek 10-Year Peak Discharge

[5] 880 Feet Upstream of Haehl Creek Low Flow Confluence; Does Not Include Haehl Creek Peak Discharges




Floodway Schematic

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY (FEET NGVD) | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY (FEET NGVD) | INCREASE (FEET NGVD) |
| Haehl/Baechtel Creek | | | | | | | | |
| A | 13,420[1] | 980/800[2] | 3,367 | 2.0 | 1,350.2 | 1,350.2 | 1,351.1 | 0.9 |
| B | 14,050[1] | 1510/620[2] | 3,982 | 1.7 | 1,352.1 | 1,352.1 | 1,352.8 | 0.7 |
| C | 17,850[1] | 50/50[2] | 281 | 11.6 | 1,364.0 | 1,364.0 | 1,364.0 | 0.0 |
| D | 18,130[1] | 340/340[2] | 970 | 3.4 | 1,367.4 | 1,367.4 | 1,367.9 | 0.5 |
| E | 19,060[1] | 115/115[2] | 396 | 8.2 | 1,371.5 | 1,371.5 | 1,371.5 | 0.0 |
| F | 21,220[1] | 40/40[2] | 457 | 6.1 | 1,384.1 | 1,384.1 | 1,384.1 | 0.0 |
| Broaddus Creek | | | | | | | | |
| A | 2,710[3] | 280 | 712 | 3.7 | 1,352.4 | 1,352.4 | 1,353.4 | 1.0 |
| B | 4,740[3] | 300 | 1,401 | 1.9 | 1,360.6 | 1,360.6 | 1,361.6 | 1.0 |
| C | 5,350[3] | 35 | 194 | 13.5 | 1,363.7 | 1,363.7 | 1,363.7 | 0.0 |
| D | 6,410[3] | 44 | 425 | 6.2 | 1,371.0 | 1,371.0 | 1,372.0 | 1.0 |
| E | 8,020[3] | 60 | 402 | 6.5 | 1,380.0 | 1,380.0 | 1,380.6 | 0.6 |
| F | 8,810[3] | 60 | 652 | 4.0 | 1,383.4 | 1,383.4 | 1,383.9 | 0.5 |
| Mill Creek | | | | | | | | |
| A | 14,630[1] | 66/536[4] | 905 | 3.5 | 1,349.4 | 1,349.4 | 1,350.2 | 0.8 |
| B | 15,320[1] | 400 | 1,152 | 2.8 | 1,354.1 | 1,354.1 | 1,355.1 | 1.0 |
| C | 16,010[1] | 100 | 497 | 6.4 | 1,359.4 | 1,359.4 | 1,360.3 | 0.9 |
| D | 17,400[1] | 32 | 242 | 13.2 | 1,367.8 | 1,367.8 | 1,368.1 | 0.3 |
| E | 18,670[1] | 55 | 532 | 6.0 | 1,375.4 | 1,375.4 | 1,376.0 | 0.6 |

[1]Feet Above Mouth [2]Width/Width Within Corporate Limits [3]Feet Above Confluence With Haehl/Baechtel Creek
[4]Left Channel/Right Channel

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

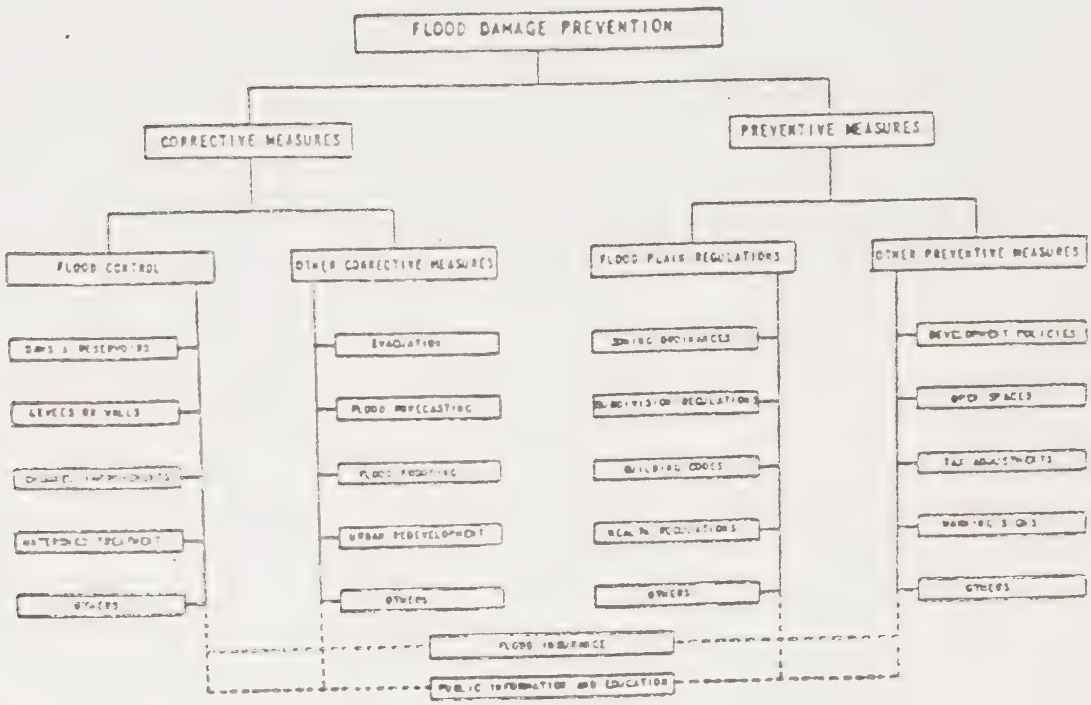
CITY OF WILLITS, CA
(MENDOCINO CO.)

**FLOODWAY DATA**

HAEHL/BAECHTEL CREEK-BROADDUS CREEK-MILL CREEK

## Flood Plain Studies and Regulations

A comprehensive program for reduction and avoidance of flood damage will include structural and non-structural measures. The following diagram is from the Framework Study cited earlier.



## Emergency Plan

The State Office of Emergency Services indicates that the State emphasis and approach to disaster preparedness has been undated since the original Administrative Document for Mendocino County was completed in 1971. The State Office now emphasizes natural hazards and local contingency planning versus the war emphasis in the original document. Local contingency planning is getting underway at the State level and Willits will be required to do local contingency planning along with other jurisdictions in the State.

Information as to existing and potential hazards contained in the Seismic Safety and Safety Elements indicate that it is essential for the City to prepare such plans. The planning concept advocated by the State Office is "mutual aid at the lowest level" with plans to send in assistance from outside agencies only if needed. Each small community is encouraged to have its own plans and to develop the capability to make an effective initial response to an emergency and to handle it locally as far as possible. This concept is particularly appropriate for the City where it is quite possible that a disaster could cut off some communities and outside help might not be available for several days. Building up the local action capability therefore is stressed in the Safety Element.

# MENDOCINO COUNTY EMERGENCY FACILITIES

## Safety Element


### hospitals

1. MENDOCINO COAST
2. FRANK R HOWARD MEMORIAL
3. HILLSIDE COMMUNITY
4. MENDOCINO COMMUNITY
5. UKIAH GENERAL

### clinics

1. ROUND VALLEY
2. COASTAL HEALTH SERVICE
3. MENDOCINO COUNTY INDIAN HEALTH PROJECT
4. ANDERSON VLY. HEALTH CENTER
5. POMO CLINIC

### high schools

1. LEGGETT
2. LAYTONVILLE
3. FORT BRAGG NORTH COAST
4. WILLETS UNION
5. MENDOCINO
6. UKIAH UNION
7. ANDERSON VALLEY
8. POINT ARENA
9. POTTER VALLEY
10. ROUND VALLEY

### county health department

1. BRANCH OFFICE
2. MESSAGE CENTER
3. MAIN OFFICE
4. MESSAGE CENTER

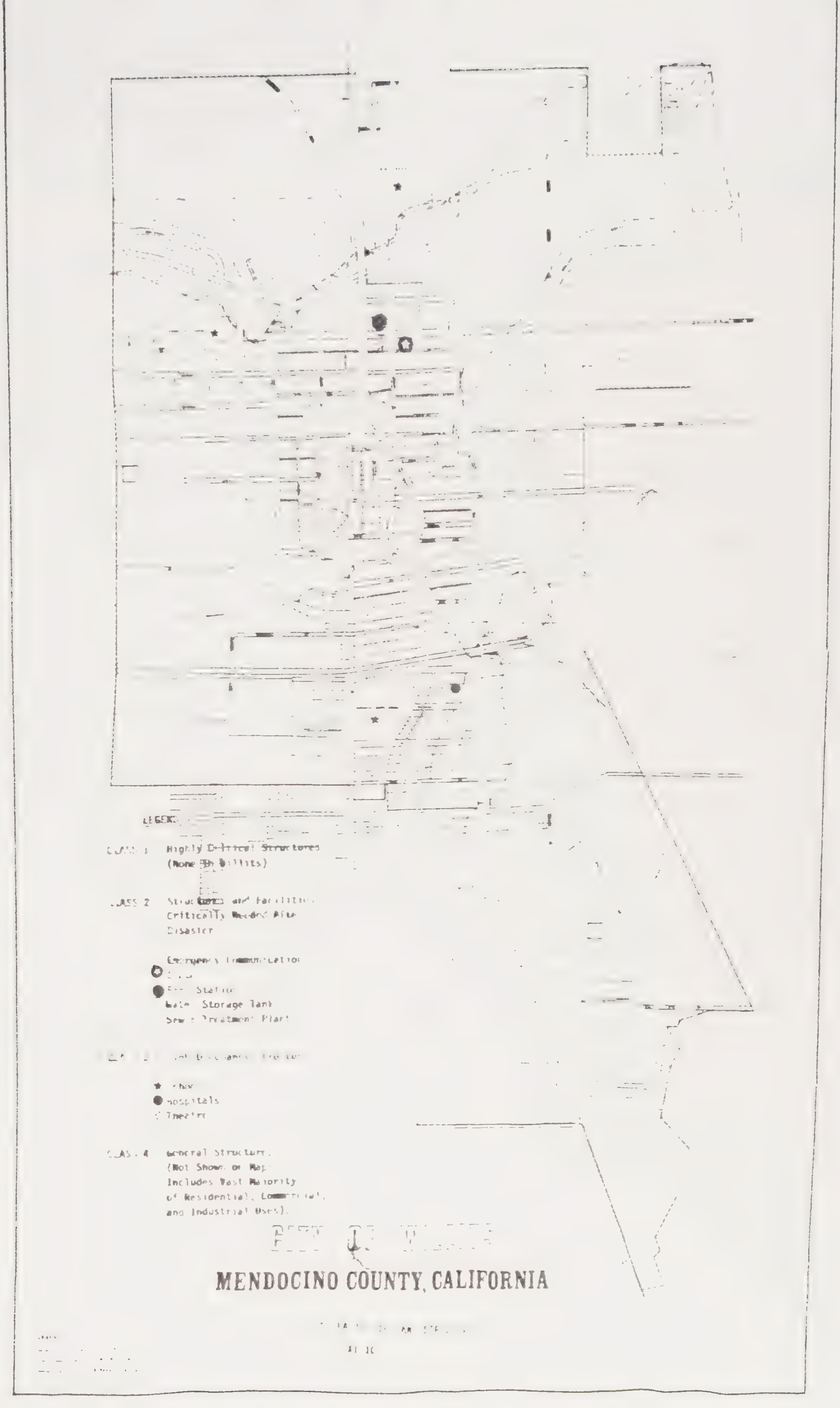
### fairgrounds

1. UKIAH
2. BOONVILLE

— major roads

TABLE 2. A SCALE OF ACCEPTABLE RISKS

| Level of Acceptable Risk | Kinds of Structures | Extra Project Cost Probably Required to Reduce Risk to an Acceptable Level |
|---|---|---|
| Class 1 (Only extremely low risk is acceptable[1]) | Highly Critical Structures: Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intertie systems, plants manufacturing or storing explosives or toxic materials.<br>Performance standard: Structural and functional integrity. | No set percentage (whatever is required for maximum attainable safety) |
| Class 2 (Slightly higher than under level 1 risk acceptable[1]) | Structures Critically Needed After Disaster: Structures whose use is critically needed after a disaster: important utility centers; hospitals; fire, police, and emergency communication facilities; fire stations; and critical transportation elements such as bridges and overpasses; also smaller dams.<br>Performance standard: Structural and functional integrity. | 5 to 25 percent of project cost[2] |
| Class 3 (Lowest possible risk to occupants of the structure acceptable[3]) | High Occupancy Structures: Structures of high occupancy, including schools, detention centers, theaters, churches, large hotels, and high-rise buildings housing large numbers of transients.<br>Performance standards: Structural integrity. | 5 to 15 percent of project cost[4] |
| Class 4 (An "ordinary" level of risk to occupants of the structure acceptable [3,5]) | General Structures: The vast majority of structures; most commercial and industrial buildings, small hotels, apartment buildings, and single family residences.<br>Performance Standard: New conformity with UBC (1976) and current zoning. | 1 to 2 percent of project cost, in most cases (2 to 10 percent of project cost in a minority of cases)[4] |
| Class 5 (Moderate to high risk acceptable) | Open Space Uses: Open space uses such as agricultural uses and parks<br>Performance Standard: Not applicable | No cost |


Highly Critical Structures
Structures and Facilities
Critically Needed After
Disaster
Storage Tank
CLASS 4 General Structures
(Not Shown on Map
Includes Vast Majority
of Residential, Commercial,
and Industrial Uses).
MENDOCINO COUNTY, CALIFORNIA

STATE OF CALIFORNIA • THE RESOURCES AGENCY • DEPARTMENT OF CONSERVATION

CALIFORNIA DIVISION OF MINES AND GEOLOGY

DIVISION HEADQUARTERS
RESOURCES BUILDING
ROOM 1341
1416 NINTH STREET
SACRAMENTO CA 95814

CDMG NOTES NUMBER 37

# GUIDELINES TO GEOLOGIC/SEISMIC REPORTS

The following guidelines are taken from "Geology and earthquake hazards: Planners guide to the seismic safety element" prepared by Grading Codes Advisory Board and Building Code Committee of the Southern California Section, Association of Engineering Geologists, July, 1973. They are reprinted here courtesy of the Association of Engineering Geologists.

## I. *Introduction*

This is a suggested guide or format for the seismic section of engineering geologic reports. These reports may be prepared for projects ranging in size from a single lot to a master plan for large acreage, in scope from a single family residence to large engineered structures, and from sites located on an active fault to sites a substantial distance from the nearest known active fault. Because of this wide variation, the order, format, and scope should be flexible and tailored to the seismic and geologic conditions, and intended land use. The following suggested format is intended to be relatively complete and not all items would be applicable to small projects or low risk sites. In addition, some items would be covered in separate reports by soil engineers, seismologists, or structural engineers.

## II. *The Investigation*

### A. *Regional Review*

A review of the seismic or earthquake history of the region should establish the relationship of the site to known faults and epicenters. This would be based primarily on review of existing maps and technical literature and would include:

1. Major earthquakes during historic time and epicenter locations and magnitudes, near the site.

2. Location of any major or regional fault traces affecting the site being investigated, and a discussion of the tectonic mechanics and other relationships of significance to the proposed construction.

### B. *Site Investigation*

A review of the geologic conditions at or near the site that might indicate recent fault or seismic activity. The degree of detail of the study should be compatible with the type of development and geologic complexity. The investigation should include the following:

1. Location and chronology of local faults and the amount and type of displacement estimated from historic records and stratigraphic relationships. Features normally related to activity such as sag ponds, alignment of springs, offset bedding, disrupted drainage systems, offset ridges, faceted spurs, dissected alluvial fans, scarps, alignment of landslides, and vegetation patterns, to name a few, should be shown on the geologic map and discussed in the report.

2. Locations and chronology of other earthquake induced features caused by lurching, settlement, liquefaction, etc. Evidence of these features should be accompanied with the following:

   a. Map showing location relative to proposed construction.

   b. Description of the features as to length, width and depth of disturbed zone.

   c. Estimation of the amount of disturbance relative to bedrock and surficial materials.

3. Distribution, depth, thickness and nature of the various unconsolidated earth materials, including ground water, which may affect the seismic response and damage potential at the site should be adequately described.

### C. *Methods of Site Investigation*

1. Surface investigation

   a. Geologic mapping.

   b. Study of aerial photographs.

   c. Review of local ground water data such as water level fluctuation, ground water barriers or anomalies indicating possible faults.

2. Subsurface investigation

   a. Trenching across any known active faults and suspicious zones to determine location and recency of movement, width of disturbance, physical condition of fault zone materials, type of displacement, and geometry.

(over)

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b. Exploratory borings to determine depth of unconsolidated materials and ground water, and to verify fault-plane geometry. In conjunction with the soil engineering studies, obtain samples of soil and bedrock material for laboratory testing.

c. Geophysical surveys which may indicate types of materials and their physical properties, ground water conditions, and fault displacements.

III. *Conclusions and Recommendations*

At the completion of the data accumulating phase of the study, all of the pertinent information is utilized in forming conclusions of potential hazard relative to the intended land use or development. Many of these conclusions will be revealed in conjunction with the soil engineering study.

A. *Surface Rupture Along Faults*

1. Age, type of surface displacement, and amount of reasonable anticipated future displacements of any faults within or immediately adjacent to the site.

2. Definition of any areas of high risk.

3. Recommended building restrictions or use-limitations within any designated high risk area.

B. *Secondary Ground Effects*

1. Estimated magnitude and distance of all relevant earthquakes.

2. Lurching and shallow ground rupture.

3. Liquefaction of sediments and soils.

4. Settlement of soils.

5. Potential for earthquake induced landslide.

IV. *Presentation of Data*

Visual aids are desirable in depicting the data and may include:

A. *General data*

1. Geologic map of regional and/or local faults.

2. Map(s) of earthquake epicenters.

3. Fault strain and/or creep map.

B. *Local or site data*

1. Geologic map.

2. Geologic cross-sections illustrating displacement and/or rupture.

3. Local fault pattern and mechanics relative to existing and proposed ground surface.

4. Geophysical survey data.

5. Logs of exploratory trenches and borings.

V. *Other Essential Data*

A. *Sources of data*

1. Reference material listed in bibliography.

2. Maps and other source data referenced.

3. Compiled data, maps, plates included or referenced.

B. *Vital support data*

1. Maximum credible earthquake.

2. Maximum probable earthquake.

3. Maximum expected bedrock acceleration.

C. *Signature and license number of geologist registered in California.*

*JFS 8-73*

CALIFORNIA DIVISION OF MINES AND GEOLOGY

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SACRAMENTO CA 95814

CDMG NOTE NUMBER 43

# RECOMMENDED GUIDELINES FOR DETERMINING THE MAXIMUM CREDIBLE AND THE MAXIMUM PROBABLE EARTHQUAKES

The following guidelines were suggested by the Geotechnical Subcommittee of the State Building Safety Board on 3 February 1975 to assist those involved in the preparation of geologic-seismic reports as required by regulations of the California Administrative Code, Title 17, Chapter 8, Safety of Construction of Hospitals. CDMG is currently using these guidelines when reviewing geologic-seismic reports.

## Maximum credible earthquake

The maximum credible earthquake is the maximum earthquake that appears capable of occurring under the presently known tectonic framework. It is a rational and believable event that is in accord with all known geologic and seismologic facts. In determining the maximum credible earthquake, little regard is given to its probability of occurrence, except that its likelihood of occurring is great enough to be of concern. It is conceivable that the maximum credible earthquake might be approached more frequently in one geologic environment than in another.

The following should be considered when deriving the maximum credible earthquake:

(a) The seismic history of the vicinity and the geologic province,
(b) the length of the significant fault or faults which can affect the site within a radius of 100 kilometers, (See CDMG Preliminary Report 13),
(c) the type(s) of faults involved,
(d) the tectonic and/or structural history,
(e) the tectonic and/or structural pattern or regional setting (geologic framework),
(f) the time factor shall not be a parameter.

## Maximum probable earthquake (functional-basis earthquake)

The maximum probable earthquake is the maximum earthquake that is likely to occur during a 100-year interval. It is to be regarded as a probable occurrence, not as an assured event that will occur at a specific time.

The following should be considered when deriving the "functional-basis earthquake":

(a) The regional seismicity, considering the known past seismic activity,
(b) the fault or faults within a 100 kilometer radius that may be active within the next 100 years,
(c) the types of faults considered,
(d) the seismic recurrence factor for the area and faults (when known) within the 100 kilometer radius,
(e) the mathematic probability or statistical analysis of seismic activity associated with the faults within the 100 kilometer radius (the recurrence information should be plotted graphically);
(f) the postulated magnitude shall not be lower than the maximum that has occurred within historic time.

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STATE OF CALIFORNIA — THE RESOURCES AGENCY — DEPARTMENT OF CONSERVATION

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CDMG NOTE — NUMBER 44

# RECOMMENDED GUIDELINES FOR PREPARING ENGINEERING GEOLOGIC REPORTS

The following guidelines are required for engineering geologic reports submitted to the Department of Public Works, County of Ventura. This information was originally printed in *California Geology*, November 1974. These guidelines are an example of "State-of-the-Art" and all the elements should be considered during the preparation and review of geologic reports. Item V was provided by the Southern California Section, Association of Engineering Geologists, the State Building Safety Board, and the California Division of Mines and Geology.

## I. GEOLOGIC MAPPING

A. Each report must be a product of independent geologic mapping of the subject area at an appropriate scale and in sufficient detail to yield a maximum return of pertinent data. In connection with this objective, it may be necessary for the geologist to extend his mapping into adjacent areas.

B. All mapping should be done on a base with satisfactory horizontal and vertical control—in general a detailed topographic map. The nature and source of the base map should be specifically indicated. For sub-divisions, the base map should be the same as that to be used for the tentative map or grading plan.

C. Mapping by the geologist should reflect careful attention to the lithology, structural elements, and three-dimensional distribution of the earth materials exposed or inferred within the area. In most hillside areas these materials will include both bedrock and surficial deposits. A clear distinction should be made between observed and inferred features and relationships.

D. A detailed large-scale map normally will be required for a report on a tract, as well as for a report on a smaller area in which the geologic relationships are not simple.

E. Where three-dimensional relationships are significant but cannot be described satisfactorily in words alone, the report should be accompanied by one or more appropriately positioned structure sections.

F. The locations of test holes and other specific sources of subsurface information should be indicated in the text of the report or, better, on the map and any sections that are submitted with the report.

## II. GENERAL INFORMATION

Each report should include definite statements concerning the following matters.

A. Location and size of subject area, and its general setting with respect to major geographic and geologic features.

B. Who did the geologic mapping upon which the report is based, and when the mapping was done.

C. Any other kinds of investigations made by the geologist and, where pertinent, reasons for doing such work.

D. Topography and drainage in the subject area.

E. Abundance, distribution, and general nature of exposures of earth materials within the area.

F. Nature and source of available subsurface information. Suitable explanations should provide any technical reviewer with the means for assessing the probable reliability of such data. (Subsurface relationships can be variously determined or inferred, for example by projection of surface features from adjacent areas, by the use of test-hole logs, and by interpretation of geophysical data, and it is evident that different sources of such information can differ markedly from one another in degree of detail and reliability according to the method used.)

## III. GEOLOGIC DESCRIPTIONS

The report should contain brief but complete descriptions of all natural materials and structural features recognized or inferred within the subject area. Where interpretations are added to the recording of direct observations, the bases for such interpretations should be clearly stated.

The following check list may be useful as a general, though not necessarily complete, guide for descriptions.

A. Bedrock—igneous, sedimentary, metamorphic types

1. Identification as to rock type (e.g., granite, silty sandstone, mica schist)
2. Relative age, and, where possible, correlation with named formations (e.g., Rincon formation, Vaqueros sandstone)
3. Distribution
4. Dimension features (e.g., thickness, outcrop breadth, vertical extent)
5. Physical characteristics (e.g., color, grain size, nature of stratification, foliation, or schistosity, hardness, coherence)
6. Special physical or chemical features (e.g., calcareous or siliceous cement, concretions, mineral deposits, alteration other than weathering)
7. Distribution and extent of weather zones, significant differences between fresh and weathered rock
8. Response to natural surface and near-surface processes (e.g., raveling, gullying, mass movement)

B. Structural features—stratification, foliation, schistosity, folds, zones of contortion or crushing, joints, shear zones, faults, etc.

1. Occurrence and distribution
2. Dimensional characteristics
3. Orientation, and shifts in orientation
4. Relative ages (where pertinent)
5. Special effects upon the bedrock (Describe the conditions of planar surfaces)
6. Specific features of faults (e.g., zones of gouge and breccia, nature of offsets, timing of movements), are faults active in either the geological sense or the historical sense?

C. Surficial (unconsolidated) deposits—artificial (manmade) fill, topsoil, stream-laid alluvium, beach sands and gravels, residual debris, lake and pond sediments, swamp accumulations, dune sands, marine and nonmarine terrace deposits, talus accumulations, creep and slopewash materials, various kinds of slump and slide debris, etc.

1. Distribution, occurrence, and relative age, relationships with present topography
2. Identification of materials as to general type
3. Dimensional characteristics (e.g., thickness, variations in thickness, shape)
4. Surface expression and correlation with features such as terraces, dunes, undrained depressions, anomalous protuberances
5. Physical or chemical features (e.g., moisture content, mineral deposits, content of expansible clay minerals, alteration, cracks and fissures, fractures)

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6. Physical characteristics (e.g., color, grain size, hardness, compactness, coherence, cementation)
7. Distribution and extent of weathered zones, significant differences between fresh and weathered material
8. Response to natural surface and near-surface processes (e.g., raveling, gullying, subsidence, creep, slope washing, slumping and sliding)

D. Drainage—surface water and groundwater
1. Distribution and occurrence (e.g., streams, ponds, swamps, springs, seeps, subsurface basins)
2. Relations to topography
3. Relations to geologic features (e.g., previous strata, fractures, faults)
4. Sources and permanence
5. Variations in amounts of water (e.g., intermittent springs and seeps, floods)
6. Evidence for earlier occurrence of water at localities now dry (e.g., vegetation, mineral deposits, historic records)
7. The effect of water on the properties of the in-place materials

E. Features of special significance (if not already included in foregoing descriptions)
1. Features representing accelerated erosion (e.g., cliff reentrants, badlands, advancing gully heads)
2. Features indicating subsidence or settlement (e.g., fissures, scarplets, offset reference features, historic records and measurements)
3. Features indicating creep (e.g., fissures, scarplets, distinctive patterns of cracks and/or vegetation, topographic bulges, displaced or tilted reference features, historic records and measurements)
4. Slump and slide masses in bedrock and/or surficial deposits, distribution, geometric characteristics, correlation with topographic and geologic features, age and rates of movement
5. Deposits related to recent floods (e.g., talus aprons, debris ridges, canyon bottom trash)
6. Active faults and their recent effects upon topography and drainage

## IV. THE BEARING OF GEOLOGIC FACTORS UPON THE INTENDED LAND USE

Treatment of this general topic, whether presented as a separate section or integrated in some manner with the geologic descriptions, normally constitutes the principal contribution of the report. It involves both (1) the effects of geologic features upon the proposed grading, construction, and land use, and (2) the effects of these proposed modifications upon future geological processes in the area.

The following check list includes the topics that ordinarily should be considered in submitting discussion, conclusions, and recommendations in the geologic reports.

A. General compatibility of natural features with proposed land use. Is it basically reasonable to develop the subject area?
1. Topography
2. Lateral stability of earth materials
3. Problems of flood inundation, erosion, and deposition
4. Problems caused by features or conditions in adjacent properties
5. Other general problems

B. Proposed cuts
1. Prediction of what materials and structural features will be encountered
2. Prediction of stability based on geologic factors
3. Problems of excavation (e.g., unusually hard or massive rock, excessive flow of groundwater)
4. Recommendations for reorientation or repositioning of cuts, reduction of cut slopes, development of compound cut slopes, special stripping above daylight lines, buttressing, protection against erosion, handling of seepage water, setbacks for structures above cuts, etc.

C. Proposed masses of fill
1. General evaluation of planning with respect to canyon-filling and sidehill masses of fill
2. [illegible] on suitability of existing [illegible]
3. Recommendations for positioning of fill masses, provision for underdrainage, buttressing, special protection against erosion

D. Recommendations for subsurface testing and exploration
1. Cuts and test holes needed for additional geologic information
2. Program of subsurface exploration and testing based upon [illegible] considerations, that is most likely to provide data needed by the soils engineer

E. Special recommendations
1. Areas to be left as natural ground
2. Removal or buttressing of existing slide masses
3. Flood protection
4. Protection from wave erosion along shorelines
5. Problems of groundwater circulation
6. Position of structures with respect to active faults

## V. SEISMIC CONSIDERATIONS

The following published guidelines should be considered when preparing seismic information.
1. CDMG Note No. 37, "Guidelines to Geologic/Seismic Reports".
2. CDMG Note No. 43, "Recommended Guidelines for Determining the Maximum Credible and the Maximum Probable Earthquakes".

## VI. DOCUMENTATION AND IMPLEMENTATION

A. The report should consider as the minimum requirement, Chapter 70, Uniform Building Code (1973). Refer to California Administration Code, Title 25, Section 1090, Excavation and Grading.

B. All material in the report should be relevant to the purpose of the report.

C. All statements should be documented by references or by accurate field observations.

D. Aerial photos (originals or suitable copies) should be included to document any discussion on landslides and faults.

E. The [illegible] of field analysis [illegible]

PYA IIS 4 75

CALIFORNIA DIVISION OF MINES AND GEOLOGY

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CDMG NOTE 46

# GUIDELINES FOR GEOLOGIC/SEISMIC CONSIDERATIONS IN ENVIRONMENTAL IMPACT REPORTS

The following guidelines were prepared by the Division of Mines and Geology with the cooperation of the State Water Resources Control Board to assist those who prepare and review environmental impact reports.

These guidelines will expedite the environmental review process by identifying the potential geologic problems and by providing a recognition of data needed for design analysis and mitigating measures. All statements should be documented by reference to material (including specific page and chart numbers) available to the public. Other statements should be considered as opinions and so stated.

## 1. *CHECKLIST OF GEOLOGIC PROBLEMS FOR ENVIRONMENTAL IMPACT REPORTS*

| GEOLOGIC PROBLEMS | | Could the project or a geologic event cause environmental problems? | | | Is this conclusion documented in attached reports? | |
|---|---|---|---|---|---|---|
| PROBLEM | ACTIVITY CAUSING PROBLEM | NO | YES | ENVIRONMENTAL PROBLEMS | NO | YES |
| EARTHQUAKE DAMAGE | Fault Movement | | | | | |
| | Liquefaction | | | | | |
| | Landslides | | | | | |
| | Differential Compaction, Seismic Settlement | | | | | |
| | Ground Rupture | | | | | |
| | Ground Shaking | | | | | |
| | Tsunami | | | | | |
| | Seiches | | | | | |
| | Flooding | | | | | |
| | (Failure of Dams and Levees) | | | | | |
| LOSS OF MINERAL RESOURCES | Loss of Access | | | | | |
| | Deposits Covered by Changed Land-Use Conditions | | | | | |
| | Zoning Restrictions | | | | | |
| WASTE DISPOSAL PROBLEMS | Change in Groundwater Level | | | | | |
| | Disposal of Excavated Material | | | | | |
| | Percolation of Waste Material | | | | | |
| SLOPE AND/OR FOUNDATION INSTABILITY | Landslides and Mudflows | | | | | |
| | Unstable Cut and Fill Slopes | | | | | |
| | Collapsible and Expansive Soil | | | | | |
| | Trench-Wall Stability | | | | | |
| EROSION, SEDIMENTATION, FLOODING | Erosion of Graded Areas | | | | | |
| | Alteration of Runoff | | | | | |
| | Unprotected Drainage Ways | | | | | |
| | Increased Impervious Surfaces | | | | | |
| LAND SUBSIDENCE | Extraction of Groundwater, Gas, Oil, Geothermal Energy | | | | | |
| | Hydrocompaction, Peat Oxidation | | | | | |
| VOLCANIC HAZARDS | Lava Flow | | | | | |
| | Ash Fall | | | | | |



For a list of geologic maps and reports available from the California Division of Mines and Geology, write to the California Division of Mines and Geology, P.O. Box 2980, Sacramento, CA 95812, or visit our District offices in SACRAMENTO, Room 118, 1416 Ninth Street; SAN FRANCISCO, Room 2022, Ferry Building; LOS ANGELES, Room 1065, 107 South Broadway.

## II. CHECKLIST OF GEOLOGIC REPORT ELEMENTS

| REPORT ELEMENTS | yes | no |
|---|---|---|
| **A. General Elements Present** | | |
| 1. Description and map of project | ☐ | ☐ |
| 2. Description and map of site | ☐ | ☐ |
| 3. Description and map of pertinent off-site areas | ☐ | ☐ |
| **B. Geologic Element (refer to checklist)** | | |
| 1. Are all the geologic problems mentioned? | ☐ | ☐ |
| 2. Are all the geologic problems adequately described? | ☐ | ☐ |
| **C. Mitigating Measures** | | |
| 1. Are mitigating measures necessary? | ☐ | ☐ |
| 2. Is sufficient geologic information provided for the proper design of mitigating measures? | ☐ | ☐ |
| 3. Will the failure of mitigating measures cause an irreversible environmental impact? | ☐ | ☐ |
| **D. Alternatives** | | |
| 1. Are alternatives necessary to reduce or prevent the irreversible environmental impact mentioned? | ☐ | ☐ |
| 2. Is sufficient geologic information provided for the proper consideration of alternatives? | ☐ | ☐ |
| 3. Are all the possible alternatives adequately described? | ☐ | ☐ |
| **E. Implementation of the Project** | | |
| 1. Is the geologic report signed by a registered geologist?* | ☐ | ☐ |
| 2. Does the report provide the necessary regulations and performance criteria to implement the project? | ☐ | ☐ |

*Required for interpretive geologic information

## III. PUBLISHED REFERENCES (selected)


**A. California Division of Mines and Geology Publications**

1. Alfors, J.T., et al., 1973. Urban geology master plan for California. Bulletin 198
2. Greensfelder, R.W., 1974. Maximum credible rock acceleration from earthquakes in California. Map Sheet 23
3. Jennings, C.W., 1973. Preliminary fault and geologic map. Preliminary Report 13
4. Oakeshott, G.B., 1974. San Fernando, California earthquake of 9 February 1971. Bulletin 196
5. Note No. 37. Guidelines to geologic/seismic reports, 1973
6. Note No. 43. Recommended guidelines for determining the maximum credible and the maximum probable earthquakes, 1975
7. Note No. 44. Recommended guidelines for preparing engineering geologic reports, 1975
8. Note No. 45. Recommended guidelines for preparing mine reclamation plans, 1975

**B. Other Publications**

1. Allen, C.R., et al., 1965. Relationship between seismicity and geologic structure in the southern California region. Bulletin of the Seismological Society of America, v. 55, no. 4
2. Bolt, B.A. and Miller, R.D., 1971. Seismicity of northern and central California 1965-1969. Bulletin of the Seismological Society of America, v. 61, no. 6
3. California Department of Water Resources, 1964. Crustal strain and fault movement investigation. Bulletin No. 116-2
4. Coffman, J.L. and von Hake, C.A., ed., 1973. Earthquake history of the United States. U.S. Department of Commerce, Publication 41-1
5. ________ ed., 1974. United States earthquakes, 1972. U.S. Department of Commerce
6. Hileman, J.A., et al., 1973. Seismicity of the southern California region, 1 January 1932 to 31 December 1972. California Institute of Technology, Contribution 2385


## IV. PUBLIC AGENCIES WITH GEOLOGIC DATA

| Source | Data Needed | | | |
|---|---|---|---|---|
| | Seismicity | Geology | Ground Water | Soils |
| Libraries and Geology and Engineering Departments of California Universities | x | x | x | x |
| California Institute of Technology | x | | | |
| California Division of Mines and Geology (Sacramento, San Francisco, Los Angeles, CA) | x | x | | |
| California Department of Water Resources (Sacramento, CA) | | x | | x |
| California Department of Transportation (District Offices) | | | | x |
| County Soil & Water Conservation Districts | | | | x |
| County Engineer and Departments of Building and Safety | x | x | | x |
| County Highway Department | | | | x |
| County Flood Control District | | | | x |
| U.S. Geological Survey (Menlo Park, CA) | | x | | |
| U.S. Corps of Engineers (District Engineers) | | x | | |
| U.S. Bureau of Reclamation (Regional Offices) | | x | | |
| U.S. Soil Conservation Service and Forest Service | | | | x |